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FILE

JAMESTOWN S'KLALLAM CASINO PROJECT

HYDROGEOLOGIC AND SEPTIC DRAINFIELD CONSIDERATIONS AND IMPACT MITIGATION

Prepared for

JAMESTOWN S'KLALLAM TRIBE

and

GROUP WEST ARCHITECTS

Prepared by

NORTHWESTERN TERRITORIES, INC.

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AN INDEPENDENTLY OWNED AFFILIATE OF BECKER INVESTIGATIVE ENGINEERING CORP.

PART I. HYDROGEOLOGIC ASPECTS OF THE PROJECT

The Jamestown S'Klallam Tribe plans to develop a casino and restaurant facility on a parcel of land at Blyn, Washington, at the south end of Sequim Bay near Sequim, Washington. The project involves acquisition and treatment of drinking water, construction of fire protection facilities, earthmoving and site development, construction of a casino building, development of approach roads and parking areas, and related work.

This report includes a preliminary analysis of the hydrogeology of the site and the hydraulics of the wells that will support the casino. Additional testing of the wells is suggested. The report also provides an overview of the wastewater treatment and disposal aspects of the project.

1. Hydrologic Characteristics of the Site

The site is a terrace of deposits of fine gravelly sands, loams and silts that appear to be underlain by a complex interbedded series of clayey silts, tills and fluvial gravels and sands. Test borings and well logs from the vicinity of the site suggest that riverine deposits and former beach deposits underlie the site at depth.

The site is at the terminus of a canyon that is deeply incised in the basalt rocks of the Crescent Formation and may be fault controlled. The valley widens and terminates in an esturine marsh that forms part of the foreshore of the south end of Sequim Bay. The proposed development site is flanked on the northeast by a wetland that will receive most of the drainage from the site.

Three creeks enter Sequim Bay in the vicinity of the casino site. The largest of the three, Jimmy Come Lately Creek, has an 18.1 square mile upland watershed and is perennial. Dean Creek, with a watershed of approximately 3 square miles, passes under Highway 101 at the northern tip of the project area. A small unnamed creek, with less than a square mile of watershed, collects water from the lowland areas in the vicinity of the site. This creek passes above the project area and through a 24-inch culvert at the gate to the Parson's parcel. Finally, the creek dissipates into a wetland and subsequently collects in a roadside ditch from which it passes under Highway 101 in a large culvert at the east edge of the project area.

The Sequim area enjoys a moderate maritime climate with consistent seasonal rainfall. Annual rainfall in the vicinity of Sequim Bay is approximately 30 inches per year. Precipitation is distinctly higher on the upland areas within the extremities of Jimmy Come Lately Creek watershed.

2. Subsurface Conditions and Hydraulics

The subsurface in the vicinity of the casino is complex stratified as a result of the wide variety of depositional conditions that have occurred locally in the past. Evidence suggests that the area has often been the site of deposits by rivers and meltwater streams leaving the canyon on the south. At several times before seawater entered the Puget Sound Lowlands, the site was covered with shallow lakes of silt-filled waters. These conditions probably prevailed while upland streams and melting icebergs continued to deposit gravels and sands near the south end of the Bay leading to the weathered silts and clays, gravels and sands that characterize the subsurface. The emergent landscape was at times lagoonal or marshy as evidenced by deposits of peat that were noted in well logs near the axis of the valley. At the close of the Ice Age, some 15,000 years ago, sea water flooded the lowland formed by glacial ice lobes creating the current landscape at Sequim Bay.

3. Generalized Hydrogeology in the Vicinity of the Project

The varied and unique conditions of geological deposition and recharge at the southern end of Sequim Bay result in a generalized hydrogeologic regime illustrated in Figure 1. Figure 1 shows a schematic section of the Blyn area near the proposed casino site. Clays and silt deposits predominate in the lower areas especially near the axis of the valley at the south end of Sequim Bay. These materials are largely impermeable and restrict vertical migration of ground water. In the same vertical section, however, there are interbeds of outwash gravels and sands that are highly permeable in the horizontal direction. These gravels and sands will yield water to wells.

Evidence from well logs in the vicinity of the project indicates that aquifers of this nature underlie a large portion of the Blyn area. Several water-bearing strata exist interbedded with the silt and clay deposits that are especially prevalent toward the center and lowest parts of the valley.

Aquifer recharge is likely to occur mainly by two mechanisms. First, massive basalt rocks flank the margins of the groundwater basin at Blyn. These rocks, which are a part of the Crescent Formation eruptive series, are believed to have a significant fracture porosity in the vicinity of the project. These rocks form the high ground on the south which receive relatively high precipitation. Thus, water that has percolated into the rock finds points of discharge in the alluvial materials overlying their basal area. Several large springs on the east side of the Blyn valley may be of this origin.

Second, the several streams that leave the hard rock areas find a direct path to recharge at the margins of the basin. Here sediments are dominated by outwash and fluvial sands and gravels and they have relatively high vertical and horizontal permeabilities.

The water recharging at the higher elevation areas creates a high level piezometric surface (water table) in the subsurface under the recharge area. Subsurface water captured in this zone finds horizontal drainage routes through the more permeable sediments (aquifers) captured between silt and clay horizons that tend to cap the flows. In the lower reaches, confining layers of silt and clay are more pronounced and the surface of the earth falls below the hydraulic level of the recharging groundwater leading to artesian conditions. Springs may occur in this zone where capping formations are absent or broached. The artesian effects are most distinct on the east side of the valley where basalt rock rises abruptly and where highly permeable marginal deposits are evident in outcrop at a quarry at the corner of Woods Road and Highway 101.

Most of the water flowing in the confined aquifers ultimately discharges to Sequim Bay in dispersed springs and seeps below present sea level. A low tide search and inventory of springs was beyond the scope of this study, but such work would tend to confirm the concepts outlined here.

Groundwater quality is apt to be quite variable in the vicinity of the project and variations in water quality in both the vertical and horizontal direction should be expected. Iron and manganese leached from alpine rocks will occur in higher concentrations where groundwater originates in acidic or swampy recharge zones. Low permeability zones in the subsurface will produce water that is highest in these contaminants and hydrogen sulfide is also likely to be present in these zones. In the most transmissive seams and aquifers, the underground residence time of water is less and, consequently, such water will tend to be less mineral laden. It is likely that there are zones within the aquifers underlying the valley that contain water which is pure enough to be used for drinking without treatment under EPA guidelines.

The Fireworks Well

The aquifer being tapped by the Fireworks Well lies about 40 feet beneath the surface and has a transmissivity of about 1,025 gpd per foot, a figure arrived at by a crude Jacobian analysis of pumping test data. (Please refer to Figure 2.) The water from this well contains 0.76 parts per million of manganese in excess of the EPA's recommended maximum contamination limit (MCL) which is set at 0.05 parts per million. At present, the EPA ascribes no ill effects to the health from manganese or iron. The MCL has been established based on the minerals' tendency to form black residue in pipes and brown stains.

The Parson's Well

The Parson's Well has not yet been thoroughly pump tested although initial reports indicate that the well is heavily contaminated with iron and manganese. Reports from the pump installer suggest that the Parson's Well has a higher static water level than the Fireworks Well. According to one unofficial report, the static water level is just a few feet below the top of the casing. These facts suggest that the Parson's Well may be more productive than the Fireworks Well.

Water quality in the Parson's Well is reportedly poor. According to Canal Pumps & Service, water from that well has nearly three parts per million iron and substantial amounts of manganese. The water is reportedly yellowish in color and has a distinct odor. If these reports are substantiated, it will be necessary to treat the water from this well prior to use for drinking water or separate potable use from non-potable uses.

4. Prospects for Salt Water Intrusion

CH2M Hill and Clallam County authorities collaborated on an excellent report on the occurrence of salt water intrusion in Clallam County. In general, they concluded that the intrusion that does occur in the County is localized and closely related to the mode of construction and operation of the well.

Salt water intrusion has been reported in the vicinity of the project at the Guilmet properties that lie between the project site and the Jamestown S'Klallam Tribe offices. Several factors suggest that the reported intrusion is localized and principally attributable to the construction of the well and\or a lack of transmissivity in the particular water-bearing zone being tapped by the well. The well in question lies in a region that is otherwise characterized by artesian wells which are protected from intrusion if pumping does not exceed the rate that the upland area can provide water. This fact, together with unconfirmed reports that the Guilmet well is shallow and among the oldest wells in the area, suggests that the intrusion may be moving into the well due to a poor surface seal or deteriorated well casing.

Evidence suggests that wells in the confined aquifers of the area will remain safe from intrusion if they are properly constructed and operated at prudent draft rates. The occurrence of confining layers tends to give some protection from intrusion, but it would be prudent to maintain water levels in the well near sea level if possible.

The exact elevation of the Fireworks Well above sea level is not known, but it is probably not more than 15 or 16 feet above mean sea level. Static water in the well is about 13.3 feet below the top of the casing, or about 11 feet below the adjacent ground. Thus, the static water level in the Fireworks Well may only be 4 or 5 feet above sea level. Drawdown on the Fireworks Well should be limited to about 5 feet of the 20 feet of drawdown observed during the pumping test at 35 gallons per minute. At a drawdown of 5 feet, discharge would be 7 gallons per minute. If well duty is intermittent, higher drafts may be used with caution. If instantaneous drafts of more than 10 gallons per minute are necessary, periodic testing of the well water should be done to detect any increase in chloride levels which are currently a very low 5 parts per million.

Water quality and quantity vary between the two wells and any future wells that may be drilled. Therefore, the final selection of drawdown and drafts should be selected to optimize both water quantity and quality,as well as to provide as much safety from subsequent seawater intrusion.

6. Ground Water Development Recommendations

To date there has been only limited testing of the Parson's Well. This well should be tested in a manner similar to the Fireworks Well. Emphasis should be placed on determining the water quality of the well water after a significant amount of pumping is done. If the water quality is as poor as reported, then the well will be of little use without expensive filtration and ion exchange softening.

Therefore, it is recommended that the well be tested for up to 24 hours at a rate of up to 50 gallons per minute. Pumping may be carried out at a draft rate of up to 50 gallons per minute and adjusted at the beginning of the test. If water quality remains poor in the Parson's Well after 8 hours, testing may be suspended.

Drafts on the existing Fireworks Well should be limited to continuous rates of 10 gallons per minute to reduce the possibility of sea water intrusion.

Because of the potential limitations of the quality of water from the Parson's Well and the probability that higher quality water may be found in the vicinity of the casino, consideration should be given to the construction of a third well. This determination may be made after pumping and water quality tests are completed on the Parson's Well.

PART II. SUBSURFACE DRAINAGE AND WASTEWATER TREATMENT AND DISPOSAL CONSIDERATIONS

Wastewater from the casino must be treated on-site because sewage treatment facilities or sewers are not available in the vicinity of the project. D.R. Strong Engineering has prepared a feasibility study for on-site treatment and disposal of wastewater. D.R. Strong conducted detailed investigations of soils in the Rambo Short Plat parcel on the western margin of the property.

The Rambo Short Plat has a total area of just over five acres. The parcel has a distinct swale running through it which appears to be a former course of the small stream. That stream now crosses Correia Road just south of the project area and is diverted away from the Rambo Short Plat behind the Morris home at 136 Correia Road.

According to Strong's estimates, the casino will produce about 12,000 gallons of wastewater per day when the casino is at capacity although typical loadings will be less. The preliminary plans suggest the separation of the building sewage into kitchen wastewater and all other wastewater. Under the current proposals, the primary treated effluent from the building, together with mechanically treated kitchen wastewater, will be introduced into the ground at points along the swale. At this point, subsurface treatment must take place and, ultimately, the treated effluent must drain away from the area underground. Eventually, much of the treated wastewater will end up in Sequim Bay some 1,100 feet away on the northeast.

Generally, septic tank and ground treatment of wastewater can produce an effluent that is substantially purified. Treatment actually takes place in the ground as effluent forms a biologically active mat within the drainfield areas. The biologically active layers that form under the drainfield also tend to retard vertical flow. Permeabilities are adversely affected by high levels of organic materials (high biological oxygen demands). Effluent with high levels of oil and grease, BOD and total dissolved solids (TDS) are especially problematic.

In the event that the drainfield does become clogged, it may be possible for effluent to surface from the drainfield area and join surface runoff before it is fully treated by movement through the ground. Drainfields may also lose some of their capacity to treat and dispose of effluent during heavy rains when soils in the drainfield are high in moisture content.

1. Potential Impacts of On-Site Wastewater Treatment on Sequim Bay

Effluent from the septic drainfields contain variable amounts of nitrates, biodegradable organics as measured by biological oxygen demand (BOD), bacteria, and viruses. Each of these constituents may have impacts on Sequim Bay.

Dissolved nitrates that eventually reach Sequim Bay would be diluted by mixing with shallow groundwater. The nitrate that eventually reaches the Bay may be, in part, detained by the natural marshes that flank the Bay where a portion would be consumed for plant growth. Some of the additional nitrates would escape the marsh zone and ultimately be consumed by phytoplankton and green algae.

Episodes of paralytic shellfish poisoning have occurred in Sequim Bay in recent years due to the occurrence of "red tides." The red tide is a bloom of dynoflagellate phytoplankton that occurs unexpectedly in vast numbers for reasons that are poorly understood. It is suspected that red tides may occur more frequently in seawater that is unusually warm or when nutrients are not limited in their marine environment. The drainfield will contribute small amounts of BOD nutrients, phosphate and nitrogen that may slightly increase the frequency of red tide occurrences.

Recent steps to manage the quality of the surface water tributary to Sequim Bay may reverse the trend toward higher concentrations of nitrogen, phosphate, and BOD within the Bay. Nevertheless, as the development of the margin of the Bay continues, septic drainfields will be increasingly important sources of nutrients that affect the life cycles of marine organisms.

Of most concern is the prospect of bacteria and virus contamination of the active oyster and clam shellfish within Sequim Bay. The presence of fecal coliform in shellfish provides evidence that enteric pathogens may be present. Thus, when this occurs, shellfish cannot be harvested or consumed.

2. Mitigating Potential Impacts of Wastewater

There are several methods to reduce the possibility that bacteria and other organisms from the casino wastewater do not reach Sequim Bay.

* Maintain Septic Tanks and Grease Traps

Drainfield clogging and break-out of effluent in a properly designed drainfield is unlikely if the drainfield and treatment system are well managed. In particular, it is necessary that floating grease, oils and sludge be removed from grease traps and septic tanks in accordance with the maintenance and operating procedures suggested by the design engineers. If such maintenance takes place, the likelihood of drainfield clogging will be significantly reduced.

* Control Excess Kitchen Discharges of Oil and Grease

Kitchen practice also has a dramatic effect on the level of grease and oil introduced into the sewage treatment system. Kitchen practices should include scrapping of food waste from dishes and pans before they are placed in dishwashers, as well as minimizing the disposal of grease and oils in the septic system.

* Disinfect Septic Effluent

During winter when soils are saturated, there is a possibility that some drainfield effluent may surface and mix with surface water. In this way, partially treated wastewater could find routes into the Bay with undesirable consequences. Disinfection of septic effluent can be done as a final step in the pretreatment process to eliminate concern about bacterial contamination of the shellfish in Sequim Bay. Disinfection by ultraviolet light (UV) is most desirable since no residuals would be produced that would interfere with the further digestion of the residual effluent BOD and nitrate in the soil. If pretreatment of all wastewater streams is completed, chlorination may be used to disinfect the treated effluent.

* Avoid High Water Table in the Drainfield

The Rambo Short Plat drainfield site has topographical and soil limitations. In particular, the presence of water at shallow depth in Test Pit #11 and the occurrence of shallow clays and restricting layers in adjacent and down-gradient soils are causes for concern. Winter rainfall adds significant amounts of water to the subsurface, and the additional water may exceed the lateral drainage capacity of the soils below the drainfield. High water tables may be avoided by installation of curtain drains which intercept soil water in the areas upstream of the septic drainfield. In addition, a culvert could be installed under Correia Road at the lowest point in the swale in the Rambo Short Plat so that all surface water is directed away from the site.

* Avoid Diversion of Surface Water Into the Drainfield

The small creek above the proposed drainfield is subject to flash flooding during heavy rain because of the steepness of the basin above. Flows during the winter of 1993-1994 produced discharges which created a barrel-full discharge through a 24-inch culvert under Correia Road just above the project site. Floodwaters from this stream could broach the channel above the draw and flood the drainfield zone if no maintenance is carried out. Periodic summer maintenance of the existing stream channel by the Jamestown S'Klallam Tribe is desirable.

3. Recommendations for Wastewater Treatment and Disposal

Due to the need for rigorous protection of the water quality in Sequim Bay, it would be best to reduce the possibility of bacteria-laden effluent reaching the estuary and the Bay beyond and to remove a large portion of the nutrients in the wastewater before it enters the ground. This may be done economically by the following methods that should be considered.

* Provide Recirculating Sand Filter Pretreatment for All Wastewater

Recirculating sand filters are a cost-effective method of BOD, nitrogen, and suspended solids reduction that can respond to a wide range of hydraulic loads. Such a pretreatment system could be built in a 3,500 square foot area and used to pretreat all wastewater. This would result in a 140 percent or higher increase in the application rates that could be used in the drainfield under Department of Health guidelines. (Recent research indicates that increased in application rate of up to 800 percent may be possible with effective pretreatment.) Use of a higher application rate in the lower area where slopes are mild should substantially reduce the cost of the drainfield installation and improve the performance of the drainfield.

Since pretreatment has already been suggested for kitchen wastewater, the treatment of all effluent, and the subsequent reduction of drainfield area, may actually lower overall costs. Effluent from a properly operated recirculating sand filter could produce an effluent that has less than ten parts per million BOD (five day), less than ten parts per million of total suspended solids, and less than 30 parts per million of nitrogen as nitrate. Consequently, all wastewater pumped to the drainfield will be at a secondary treatment level before it is introduced to the soil. The pretreatment method also makes it possible to consider the use of chlorination as a disinfection method.

* Consider Providing a Curtain Drain Above Drainfield

By reducing the drainfield area, it may be possible to introduce a curtain drain above the drainfield at the Rambo Short Plat. This curtain drain could be implemented after and over winter observation of shallow groundwater levels in the area just below the drainfield.

* Additional Suggestions for Cost Reductions

Economy could be achieved by providing a siphon dosing chamber in the upper part of the Rambo Short Plat that is fed by two small submersible pumps installed in a much smaller wet well that receives the effluent from the pretreatment process somewhere near the casino building. If this proves to be feasible, the higher costs of large capacity dosing pumps (and related three-phase electrical power) and large capacity dosing chamber may be avoided. For septic systems with flows between 3,500 and 14,500 gallons per day, the Washington State Department of Health now requires that 50 percent of the reserve drainfield be constructed initially. With the use of recirculating sand filter pretreatment and disinfection, the possibility of drainfield clogging is minimized. Since substantial reserve area is available for an additional drainfield, should it be necessary, it may be possible to eliminate the redundant 50 percent reserve drainfield construction in the initial installation.

Steve S. Luxton, MSc., P.E.
Water Resource Specialist

EXPIRES: 3/23/94

FC: Jmstwn.GEO
DIR: Eng\Rpt

CANAL PUMPS & SERVICE, INC

261431 HWY 101 , SEQUIM, WA 98382K
683-6328 683-4220

NAME: Jamestown Klallam Indian Tribe 683-1109
ADDRESS: 305 Old Blyn Hiway
CITY & STATE: Sequim, WA. 98382

RE: 200,000 Gallon Capacity Flow Test

Storca 1987 Bill Schmidt

DATE: March 19, 1993

DEPTH: 57'
STATIC: 13' 4 1/4"
G.P.M.: 35

DATE	TIME	STATIC	DRAWDOWN	G.P.M.
3/8/93	9:29 A.M.	13' 4 1/4"		
"	9:30		14' 10"	35
"	9:31		15' 11 1/2"	35
"	9:35		18' 10 3/4"	35
"	9:40		21' 1"	35
"	9:50		23' 9"	35
"	10:00		25' 7 3/4"	35
"	10:15		28' 2"	35
"	10:30		28' 8 3/4"	35
"	11:00		29' 1/2"	35
"	11:30		29' 7"	35
"	12:00 P.M.		30' 1"	35
"	12:30		30' 6 1/4"	35
"	1:00		30' 11"	35
"	1:30		31' 3"	35
"	2:00		31' 7 1/4"	35
"	2:30		31' 5 1/2"	35
"	3:00		31' 8"	35
"	3:30		31' 9 3/4"	35
"	4:00		31' 11"	35
"	4:30		32' 1/4"	35
"	5:00		32' 1"	35
"	5:30		32' 1"	35
"	6:00		32' 1"	35
"	7:00		32' 1"	35
"	8:00		32' 1 1/2"	35
"	9:00		32' 1"	35
"	10:00		32' 1"	35
3/9/93	12:00 A.M.		32' 1 1/4"	35
"	2:00		32' 1"	35

(Cont)

(Cont.)

"	5:00	32' 1"	35
"	8:00	32' 1"	35
"	12:00 P.M.	32' 3/4"	35
"	4:00	32' 1"	35
"	8:00	32' 1"	35
3/10/93	1:00 A.M.	32' 1"	35
"	4:00	32' 1"	35
"	8:00	32' 1 1/4"	35
"	12:00 P.M.(VOC SAMPLES)	32' 1"	35
"	4:00	32' 1"	35
"	8:00	32' 1"	35
3/11/93	12:00 A.M.	32' 1"	35
"	4:00	32' 1"	35
"	8:00	32' 3/4"	35
"	12:00 P.M.(CHEMICAL & BACT.)	32' 1/2"	35
"	4:30	32' 1"	35
"	8:00	32' 1"	35
3/12/93	1:00 A.M.	32' 1"	35
"	5:00	32' 1 1/2"	35
"	8:00	32' 1 1/4"	35
"	9:30	32' 1"	35
	Stop Test		

RECOVERY

3/12/93	9:31 A.M.	26' 3 1/2"
"	9:32	21' 8"
"	9:33	18' 7"
"	9:35	17' 8 1/2"
"	9:45	17' 2 1/4"
"	10:00	16' 11"
"	10:15	16' 9 1/4"
"	10:30	16' 7"
"	11:00	16' 5 3/4"
"	3:30 P.M.	15' 10 3/4"
3/13/93	8:30 A.M.	13' 8 3/4"

PREPARED BY: Ed Chartier

Please Print Plainly
USE HEAVY PENCIL
DO NOT WRITE IN SHADED AREAS

LABORATORY NAME
Cascade Analytical Service
3640 S. Cedar, Suite "J"
Tacoma, Wa 98409 206-472-6909

SEE BACK FOR INSTRUCTIONS

WATER SAMPLE INFORMATION FOR INORGANIC CHEMICAL ANALYSES

LAB. NUMBER	CO.	CITY	DATE RECEIVED	DATE COLLECTED	COLLECTED BY:
020-04145	05		03/12/93	3/11/93	CANAL PUMPS Telephone: (206) 683-6328

Is this a follow-up of a previous sample? Yes ☐ No ☒

If yes, what was the laboratory number of the previous sample? ______

SYSTEM I.D. NO.	SYSTEM NAME:	SYSTEM CLASS (circle one)	COUNTY
	JAMESTOWN KLALLAM INDIAN TRIBE	1 2 (3) 4 B	CLALLAM

SAMPLE LOCATION: 1 / WELL-HEAD

THIS SAMPLE TAKEN BEFORE TREATMENT ☒ U AFTER ☐ T

IF TAKEN *AFTER* TREATMENT WAS IT: ☐ FILTERED ☐ FLOURIDATE ☐ CHLORINATED ☐ WATER SOFTENER: TYPE USED ______

SOURCE TYPE: ☐ 1. SURFACE ☒ 3. WELL ☐ 2. SPRING ☐ 4. PURCHASE

SOURCE NO. 01

IF SOURCE IS LAKE OR STREAM, ENTER NAME

IF SAMPLE WAS DRAWN FROM DISTRIBUTION SYSTEM IT WAS COLLECTED FROM SYSTEM AT: (ADDRESS)

DATE OF FINAL REPORT: 3/26/93

REMARKS:
TDS 175 ok
Copper < 0.10mg/L ok
Zinc < 0.10mg/L ok

SEND REPORT TO: (PRINT FULL NAME & ADDRESS)
Canal Pumps (NAME)
261431 Hiway 101 (STREET)
Sequim (CITY) WA (STATE) 98382 (ZIP CODE)
TELEPHONE: (206) 683-6328 (Area Code)

LABORATORY REPORT
(DO NOT WRITE BELOW THIS LINE)

TEST	MCL	Less Than <	RESULTS		Compliance YES	Compliance NO	Chemist Initials	Laboratory Number (If different than above)
Arsenic As	0.05 P	<	0.005	mg/l	✓		JTV	
Barium Ba	1.0 P	<	.05	mg/l	✓			
Cadmium Cd	0.01 P	<	0.001	mg/l	✓			
Chromium Cr	0.05 P	<	0.001	mg/l	✓			
Iron Fe	0.3		0.06	mg/l	✓			
Lead Pb	0.05 P		0.002	mg/l	✓			
Manganese Mn	0.05		0.766	mg/l		✓		
Mercury Hg	0.002 P	<	.0002	mg/l	✓			
Selenium Se	0.01 P	<	0.005	mg/l	✓			
Silver Ag	0.05 P	<	0.001	mg/l	✓			
Sodium Na			12	mg/l	✓			
Hardness			156	mg/l As CaCO3	✓			
Conductivity	700 P		319	Micromhos/cm 25° C	✓			
Turbidity	1.0 P		0.3	NTU	✓			
Color	15.0 P		5.0	Color Units	✓			
Fluoride F	2.0	<	0.1	mg/l	✓			
Nitrate as N	10.0	<	0.1	mg/l	✓			
Chloride Cl	250		5	mg/l	✓			
Sulfate SO_4	250		8	mg/l	✓			

* MCL is the Maximum Contaminant Level Allowed
P. Primary Standard

Laboratory Supervisor JTV

DOH 307-002 (4/90) FRONT

WATER SUPPLIER COPY

State of Washington
Department of Health
Division of Public Health Laboratories

WATER BACTERIOLOGICAL ANALYSIS

If instructions are not followed, sample will be rejected.

DATE COLLECTED (MONTH / DAY / YEAR)	TIME COLLECTED	COUNTY NAME
3 / 11 / 93	2:30 ☐ AM ☒ PM	CLALLAM

TYPE OF SYSTEM: ☒ PUBLIC ☐ INDIVIDUAL (serves only 1 residence)

IF PUBLIC SYSTEM, COMPLETE: I.D. No. [ ] CIRCLE GROUP (A) B

NAME OF SYSTEM: Jamestown Klallam Indian Tribe

SPECIFIC LOCATION WHERE SAMPLE COLLECTED: Well Head

TELEPHONE NO. DAY ( ) EVENING ( )

SAMPLE COLLECTED BY: (Name) Ed Chartier

SYSTEM OWNER/MGR.: (Name) Klallam Indians

SOURCE TYPE ☐ GROUND WATER UNDER SURFACE INFLUENCE
☒ SURFACE ☒ WELL or WELL FIELD ☐ SPRING ☐ PURCHASED or INTERTIE ☐ COMBINATION or OTHER

SEND REPORT TO: (Print Full Name, Address and Zip Code)
Hanna Pumps & Service
261431 Hiway 101
Sequim WASHINGTON 98382

TYPE OF SAMPLE (check only one in this column)

☒ ROUTINE DRINKING WATER check treatment →
- ☐ Chlorinated (Residual: ____ Total ____ Free)
- ☐ Filtered
- ☒ Untreated or Other ______

☐ REPEAT SAMPLE Previous coliform presence Lab # ______ Date __/__/__

☐ RAW SOURCE WATER Source # S [ ][ ] ☐ Total Coliform ☐ Fecal Coliform
☐ NEW CONSTRUCTION or REPAIRS
☐ OTHER (Specify) ______

REMARKS:

(LAB USE ONLY) DRINKING WATER RESULTS

☐ UNSATISFACTORY, Coliforms present
REPEAT SAMPLES REQUIRED ☐ E. Coli present ☐ E. Coli absent ☐ Fecal present ☐ Fecal absent

☒ SATISFACTORY, Coliforms absent

OTHER LABORATORY RESULTS

TOTAL COLIFORM 0 /100 ml E. COLI ____ /100ml
FECAL COLIFORM ____ /100 ml PLATE COUNT ____ /ml

ANOTHER SAMPLE REQURED

SAMPLE NOT TESTED BECAUSE:
- ☐ Sample too old
- ☐ Wrong container
- ☐ Incomplete form
- ☐ ______

TEST UNSUITABLE BECAUSE:
- ☐ Confluent growth
- ☐ TNTC
- ☐ Turbid culture
- ☐ Excess debris

LAB NO. (7 DIGITS)	DATE, TIME RECEIVED	RECEIVED BY
20-09397	3-12-93 12:30P	2

DATE REPORTED: 3-13-93

LABORATORY: CASCADE ANALYTICAL SERVICE
3640 S. Cedar, Suite O • Tacoma, WA 98409
(206) 472-6909

State of Washington Depatment of Health Public Laboratories
1610 NE 150th Street, Seattle, Washington 98155 (206) 361-2898

VOLATILE ORGANIC CHEMICAL REPORT

Results of Analysis by EPA Method 524.2
Measurement of Purgeable Organic Compounds in Water by Capillary Column
Gas Chromatography/Mass Spectrometry

Send Report To:
Canal Pumps Service
261431 Hwy 101
Sequim, WA 98382

Bill:
same

COUNTY	: Clallam			
SYSTEM NAME	: Jamestown Klallam Indian Tribe			
SYSTEM ID NO.	:	LABORATORY NO.	: 5407334	
DATE COLLECTED	: 3-10-93	DATA FILE	: >3C11Z	
DATA DATE ANALYZED	: 3-11-93	ANALYST	: Rowena	
SOURCE NUMBER	: S01	DATE OF REPORT	: MR 3-16-93	
SOURCE TYPE	: well/gw	SUPERVISOR'S INITIALS	:	Cost $260.00

EPA CODE	NAME OF COMPOUND	MCL* µg/L	AMOUNT µg/L	EPA CODE	NAME OF COMPOUND	AMOUNT µg/L
	REGULATED COMPOUNDS				UNREGULATED COMPOUNDS	
29[illegible]6	VINYL CHLORIDE	2	ND	2210	CHLOROMETHANE	ND
29[illegible]7	1,1-DICHLOROETHYLENE	7	ND	2214	BROMOMETHANE	ND
29[illegible]1	1,1,1-TRICHLOROETHANE	200	ND	2216	CHLOROETHANE	ND
29[illegible]2	CARBON TETRACHLORIDE	5	ND	2978	1,1-DICHLOROETHANE	ND
29[illegible]0	BENZENE	5	ND	2416	2,2-DICHLOROPROPANE	ND
29[illegible]0	1,2-DICHLOROETHANE	5	ND	2410	1,1-DICHLOROPROPANE	ND
29[illegible]4	TRICHLOROETHYLENE	5	ND	2408	DIBROMOMETHANE	ND
29[illegible]9	P-DICHLOROBENZENE	75	ND	2412	1,3-DICHLOROPROPANE	ND
29[illegible]9	T-1,2-DICHLOROETHYLENE	100	ND	2986	1,1,1,2-TETRACHLOROETHANE	ND
23[illegible]	CIS-1,2-DICHLOROETHYLENE	70	ND	2993	BROMOBENZENE	ND
29[illegible]3	1,2-DICHLOROPROPANE	5	ND	2414	1,2,3-TRICHLOROPROPANE	ND
29[illegible]1	TOLUENE	1000	ND	2988	1,1,2,2-TETRACHLOROETHANE	ND
29[illegible]7	TETRACHLOROETHYLENE	5	ND	2965	O-CHLOROTOLUENE	ND
29[illegible]9	CHLOROBENZENE	100	ND	2966	P-CHLOROTOLUENE	ND
29[illegible]2	ETHYL BENZENE	700	ND	2967	M-DICHLOROBENZENE	ND
29[illegible]5	M/P-XYLENE + O-XYLENE	10000	ND	2212	DICHLORODIFLUOROMETHANE	ND
29[illegible]7			ND	2218	TRICHLOROFLUOROMETHANE	ND
29[illegible]6	STYRENE	100	ND	2430	BROMOCHLOROMETHANE	ND
29[illegible]8	O-DICHLOROBENZENE	600	ND	2994	ISOPROPYLBENZENE	ND
29[illegible]4	METHYLENE CHLORIDE	5	ND	2998	N-PROPYLBENZENE	ND
29[illegible]5	1,1,2-TRICHLOROETHANE	5	ND	2424	1,3,5-TRIMETHYLBENZENE	ND
24[illegible]8	1,2,4-TRIMETHYLBENZENE	70	ND	2426	TERT-BUTYLBENZENE	ND
	TRIHALOMETHANES (THM)			2428	SEC-BUTYLBENZENE	ND
29[illegible]1	CHLOROFORM		ND	2030	P-ISOPROPYLTOLUENE	ND
29[illegible]3	BROMODICHLOROMETHANE		ND	2422	N-BUTYLBENZENE	ND
29[illegible]4	CHLORODIBROMOMETHANE		ND	2378	1,2,4-TRICHLOROBENZENE	ND
29[illegible]2	BROMOFORM		ND	2248	NAPTHTHALENE	ND
				2246	HEXACHLOROBUTADIENE	ND
				2420	1,2,3-TRICHLOROBENZENE	ND
				2228	CIS-1,3-DICHLOROPROPENE	ND
				2224	TRANS-1,3-DICHLOROPROPENE	ND

*MCL : Maximum Contaminant level
NOTE : An amount of ND µg/L indicates that the true concentration is less than the method detection limit of 0.5 µg/L.

ATTENTION BILL SCHMIT

FOR: JAMESTOWN INDIAN FIREWORK DATE: JUNE 16 1987

ADDRESS: PHONE:

WATER TEST RESULTS	YOUR WATER PROBLEMS
iron: 1.0 turbidity: pH: 7.0 sodium hardness: 12 gr. chloride: NONE sulfur: NONE tannin acid: NONE taste: NONE man.: .03 odor: NONE color: CLEAR	type of iron: FERROUS — WILL CAUSE STAINING hardness: 12 GRAINS HARD — WILL CAUSE WATER SPOTS ON FIXTURES, IMPROPER OPERATION OF CLOTHES WASHER, & EXCESSIVE DAMAGE TO HOT WATER ELEMENTS
WATER SYSTEM INFORMATION source: well lake city other pump type: flow rate: family members:	pH: 7.0 — NUETRAL, NO PROBLEMS sulfur: NONE
EQUIPMENT COST	EQUIPMENT PROPOSED
1000.00 15.00 75.00 $1090.00 PLUS TAX	MARLO GLC 14 S MISC FITTINGS SERVICE CALL & LABOR THE ABOVE UNIT WILL BACK WASH 5 GALLONS OF WATER FOR 2 MINUTES AFTER 140 GALLONS OF WATER HAVE PASSED THRU. DOES NOT REQUIRE ANY ELECTRICITY AND WILL REMOVE ALL ELEMENTS IN YOUR WATER.
TESTED BY: Ed Chartier	CANAL PUMPS AND SERVICE 683-6328