24-02 Carmen Johnson
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# INTERNATIONAL PAPER
# RIEGELWOOD, NORTH CAROLINA LANDFILL

## PRELIMINARY EVALUATION
## OF THE
## EXISTING LANDFILL

Prepared For:

International Paper
Riegelwood, North Carolina

Prepared by:

Rust Environment & Infrastructure
5510 Six Forks Road
Raleigh, North Carolina 27609

June 1996

NORTH CAROLINA PROFESSIONAL SEAL 14799 ENGINEER JOHN G. FUNK
6/28/96

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## 1.0 PURPOSE

International Paper Riegelwood Mill proposes to operate its existing industrial waste landfill after January 1, 1998. To that end, this report is intended to provide the information requested in the Division of Solid Waste Management's letter of January 18, 1996 to Federal Paper Board (currently International Paper) to assist the Division in its preliminary evaluation of the existing landfill's compliance with the groundwater quality standards (15A NCAC 2L).

## 2.0 ORGANIZATION

This report provides a brief description of the waste stream characterization over the life of the landfill and a site characterization which consist of site maps which show the current waste footprint, projected waste boundary as of January 1, 1998, Mill property boundaries, and existing groundwater monitoring wells. Please note that permitted waste boundaries, and permitted facility boundaries are not applicable to the landfill at the Rieglewood Mill. In addition, this report provides an analysis and explanation of groundwater monitoring results relative to the groundwater standards and a proposed plan to ensure that the design of the existing landfill will be protective of local groundwater. The groundwater evaluation contained in this report is based upon the results of groundwater sampling and analyses conducted from 1989 through April 1996 by Law Engineering.

## 3.0 WASTE STREAM CHARACTERIZATION

International Paper Company operates a pulp and paper mill in Riegelwood, North Carolina. The mill was previously operated by Federal Paper Board, which was acquired by International Paper Company in early 1996. The mill began operations in 1952. The landfill is contained within the Mill Site. This landfill is owned and operated by International Paper Company pursuant to a permit from

the Solid Waste Section of DEHNR issued in 1972. The landfill began operations in 1952. The landfill provides a disposal area for process and other solid wastes associated with the operation of the mill.

Estimated current waste quantities disposed in the landfill are as follows:

| WASTE | ESTIMATED QUANTITY (TONS/WEEK) | ESTIMATED QUANTITY ($YD^3$/WEEK) |
|---|---|---|
| Woodyard | 510 | 1,430 |
| Bottom Ash | 210 | 280 |
| Grits | 130 | 150 |
| Dregs | 400 | 400 |
| General Mill | 100 | 650 |
| Sawmill Waste: | | |
| Trash | 30 | 30 |
| Ash | 60 | 70 |
| Bark/Wood | 50 | 50 |
| Sludge | 240 | 260 |
| **TOTAL** | 1,730 | 3,320 |

Woodyard waste is composed of old logs and wood chips, bark, wood chips mixed with soil, and miscellaneous types of wood. Bottom ash is ash from the moving grate from the power boilers. Grits are caustic rejects from lime slakers used in the process. Dregs are kiln waste recovered in the dregs filter. General mill waste is comprised of loose trash from the mill and trash from the office and mill areas placed in dumpsters (including waste from cafeteria and vending machine areas). As described

in the above table the sawmill waste was comprised of general trash from office and employee areas, ash, bark and miscellaneous types of wood. Sludge is generated in the wastewater treatment process, and can originate from clarifiers or ponds/lagoons. Sludge can be in the form of dewatered sludge (mechanically dewatered) or in the form of thickened sludge (thickening by natural evaporation and consolidation in the sludge ponds.

Past operating years may have seen some differences in the total quantity of waste to the landfill, but the relative relationship in quantities is thought to have remained constant due to consistency in the process operation of the mill.

Some demolition debris consisting of concrete, brick/block, pipe, miscellaneous metals, and other miscellaneous materials may have also been placed in the landfill over the operating life of the facility, but the amount is difficult to quantify at this time.

The Town of Riegelwood was allowed to dispose of its municipal waste from 1962 to 1980, and a local commercial area (convenience store/restaurant) was allowed to dispose of its solid waste until 1990. The Town of Riegelwood is strictly residential in nature, with a small commercial zone, and an approximate population of 300. The type of solid waste would have been typical of a residential area, and the quantity would have been commensurate with an average population of 300 people. Therefore the contribution from this source would have been insignificant compared to the other solid waste streams.

A portion of the current operation of the landfill has been reserved for two environmental remediation operations. Asbestos containing materials from on-going asbestos abatement activities are disposed in a designated area of the landfill. The quantity of this disposal activity varies, but is estimated to generate approximately ½ $yd^3$/week. In addition, another area is currently reserved for soil

remediation for corrective action of contaminated soil areas elsewhere in the mill. The mill was issued a land application non-discharge permit for a one time placement of contaminated soils from elsewhwere in the mill for remediation of contaminated soils. Soils contaminated with volatile organics are placed in wind rows which are turned periodically to allow volatilization and biodegradation to occur to remediate the soils. The quantity of contaminated soils in the landfill is estimated to be 2,000 $yd^3$.

In the very near future International Paper expects to execute agreements to have the general mill waste eliminated from disposal at the landfill, and said waste will be disposed at appropriately permitted commercial facilities off-site.

All major waste streams have been tested in conformance with the Toxicity Characteristic Leaching Procedure (TCLP) and found to be non-hazardous. Copies of the TCLP tests are provided in Appendix A.

## 4.0 SITE CHARACTERIZATION

The enclosed Rust drawing number 37140-C-01 shows the existing landfill waste boundaries, the groundwater monitoring well locations and the Riegelwood Mill property boundaries. The current waste footprint based upon an aerial survey conducted on May 20, 1996 and the projected waste boundary as of January 1, 1998 are provided on drawing 37140-C-02 (note that the two boundaries coincide). In addition, the groundwater flow direction in the landfill area is provided on drawing 37140-C-03.

## 5.0 LANDFILL GROUNDWATER MONITORING PROGRAM

Groundwater quality in the landfill area is currently monitored through sample collection and analysis of groundwater collected from a network of six wells located up and down gradient of the landfill and wastewater treatment basin. This section provides a brief description of the landfill area geology and hydrogeology and of the landfill groundwater monitoring program.

### 5.1 LANDFILL AREA GEOLOGY AND HYDROGEOLOGY

The Mill property and the landfill are located in the Coastal Plain physiographic province of North Carolina, which consists predominantly of silts, sands, and clays of marine origin. Topographically, the Coastal Plain is relatively flat with small to moderate relief. In the river valleys, relief can be more substantial as the result of river erosion. The specific area of the mill is underlain in the near surface by two formations, the Waccamaw Formation and the Pee Dee Formation. The Waccamaw Formation overlies the Pee Dee Formation and consists of a loosely consolidated, fossiliferous sand with silt and clay. According to previous investigations at the site, the Waccamaw Formation ranges in thickness from about 5 feet on the southeast side of the landfill (monitoring well 8A) to about 34 feet on the west side of the landfill (monitoring well 1A). The Pee Dee Formation is described as glauconitic, locally fossiliferous and calcareous sand, clayey sand, and clay. Based on borings advanced through the Pee Dee Formation in the area of the mill and landfill, this unit is about 200 feet thick.

Boring logs and cross-sections of soil borings and monitoring wells at the site (Law Engineering) indicate the Waccamaw Formation is characterized by grey, white, and dark brown sand to silty sand with occasional lenses of clay. The Pee Dee Formation is described as a dark grey to black, silt and

fine-grained sand with little clay. The Waccamaw Formation appears to cover the land surface throughout the site with the Pee Dee Formation outcropping along the Cape Fear River.

Groundwater at the site occurs as an unconfined aquifer in the surficial Waccamaw sands. Ground water was also encountered in the Pee Dee Formation, but this upper part of the formation (based on permeability discussed below) is more appropriately considered a confining layer. Water table elevation measurements indicate that groundwater is present at an elevation of about 45 feet on the west side of the landfill and an elevation of about 10 feet on the east side of the landfill between the lagoon dike and Livingston Creek and on the north side of the lagoon between the dike and the Cape Fear River. These elevation changes indicate the direction of groundwater flow is to the Cape Fear River and to Livingston Creek, which is consistent with these two features being groundwater discharge points. According to the previous investigations, monitoring well pairs with screened intervals in the surficial Waccamaw aquifer and in the deeper Pee Dee aquifer indicated there is an upward hydraulic gradient in the area of the Cape Fear River and Livingston Creek, further supporting the presence of groundwater discharge. In addition, data from the monitoring wells suggest that water from the lagoon or landfill may be hydraulically connected to the groundwater, but a mounding effect is not observed outside the lagoon boundaries.

Hydraulic conductivity testing was conducted on the monitoring wells in both aquifers (Law 1988). The hydraulic conductivity results for the surficial (Waccamaw) aquifer range from 2.0 to about 0.1 feet per day. Based on the hydraulic conductivity range, hydraulic gradients from groundwater elevation differences, and estimated porosity, the average linear groundwater velocity was calculated to range from a low of 3 feet per year to 44 feet per year. Only one well (well 1A) was in the high end of the range while four wells indicated a velocity of 28 to 44 feet per year and three wells indicated a velocity of 0.02 to 3.2 feet per year.

The hydraulic conductivity for the Pee Dee Formation range from 0.0003 to 0.005 feet per day, which results in a velocity of 0.01 to 0.79 feet per year. These values are in a range consistent with silts and clays as encountered in this deeper aquifer and is considered low in comparison to the surficial aquifer. The difference in velocity is sufficient for the Pee Dee Formation in this area to be considered as a confining layer for vertical groundwater movement.

Representative values of hydraulic conductivity and gradient for the Waccamaw and Pee Dee Formations were used to determine the volume of groundwater flow into the Cape Fear River and Livingston Creek. The calculation was performed in two parts due to the variation in hydraulic conductivity between the shallow sediments of the Waccamaw Formation (shallow aquifer) and the deeper lithologies of the Pee Dee Formation.

The velocity of groundwater flow in each formation was determined using the formula:

$$v = K\,i$$

where

v = velocity
K = hydraulic conductivity
i = hydraulic gradient

For the Waccamaw Formation, the average hydraulic conductivity (K) was determined to be 0.755 ft/day based on results of slug tests conducted by Law. Results of slug tests which did not have sufficient data for analysis were not included in determining the average hydraulic conductivity. The hydraulic gradient (i) was measured to be approximately 0.009 ft/ft (similar to the hydraulic gradient

determined by Law) based on water level measurements in shallow monitoring wells in the vicinity of discharge points. This resulted in a discharge velocity of 0.0068 ft/day.

For the Pee Dee Formation, the average hydraulic conductivity (K) was determined to be 0.0015 ft/day based on results of slug tests conducted by Law. The hydraulic gradient (i) was measured to be approximately 1.5 $E^{-2}$ ft/ft based on water level measurements in deeper monitoring wells in the vicinity of discharge points. This resulted in a discharge velocity of 0.000023 ft/day.

The linear distance along the Cape Fear River and Livingston Creek that would be impacted by groundwater discharge from the facility was measured to be about 6600 feet. The average saturated thickness of the Waccamaw Formation in the vicinity of discharge areas was determined to be 11 feet. This resulted in a cross-sectional area of 72,600 $ft^2$.

It was estimated that impacted groundwater may be present to a depth of 30 feet in the Pee Dee Formation. This resulted in a cross-sectional area of 198,000 $ft^2$.

The volume of groundwater discharge is the velocity of groundwater flow multiplied by the cross-sectional area of discharge. For the Waccamaw Formation this resulted in a discharge of 494 $ft^3$/day and for the Pee Dee Formation this resulted in a discharge of 4.55 $ft^3$/day. Assuming a saturated thickness in the surficial aquifer of 11 feet at the Cape Fear River and Livingston Creek and a length of groundwater discharge of 6600 feet, results in a discharge of groundwater to the river and the creek on the order of 500 cubic feet per day (3,750 gallons per day).

## 5.2 GROUNDWATER MONITORING SYSTEM

The landfill at the Riegelwood Mill is constructed on a 60 acre peninsula within the Mill's wastewater treatment basin. The landfill groundwater monitoring well network consists of a total of 16 wells. The monitoring well records are provided in Appendix B. Five of the monitoring wells were constructed in 1986 and are designated as boring B-1, B-2, B-3, B-4, and B-5 on the well construction records. It is our understanding that these wells are currently designated as monitoring wells MW-1A, MW-2A, MW-3A, MW-4A, and MW-5A respectively. Eleven additional wells were constructed in 1988 and are designated as monitoring wells MW-1B, MW-2B, MW-3B, MW-4B, MW-5B, MW-6A & B, MW-7A &B, and MW-8A & B. The complete system consists of eight shallow (designated as A wells) and eight deep wells (designated as B wells) installed as two well clusters around the landfill as shown on the enclosed Rust drawings. The A wells are screened within the surficial aquifer, and the B wells are screened within the Pee Dee formation which underlies the surficial aquifer.

## 5.3 GROUNDWATER ANALYTICAL PROTOCOLS

The eight shallow and eight deep wells were initially sampled in April 1988 and the groundwater samples were analyzed for phenols, total dissolved solids, chloride, iron, manganese, and mercury. From 1989 through 1992, groundwater samples were collected annually from six wells: MW-1A, MW-1B, MW-4A, MW-5A, MW-7A, and MW-8A; and from 1993 to the present, groundwater samples were collected semi-annually. A summary of the analysis is provided in Table 1.

The Mill performs a priority pollutant analysis on its wastewater discharge semi-annually. Discharge analysis for the period of 1993 through April 1996 was supplied to Rust for the purpose of this evaluation. The location of the wastewater treatment basin likely affects the results of groundwater analysis from the landfill monitoring well network, and the results from the effluent sampling and analysis of basin effluent have applicability to the evaluation of groundwater impact from the landfill.

The results for the three years of data provided, which we understand are representative, do not show the presence of VOC's (EPA 624 constituents); semi-volatiles (EPA 625 constituents); or pesticides and PCB's (EPA 8080, 8140 and 8150 constituents) in the basin effluent. The absence of VOC's in the effluent would be expected since the primary treatment method employed in the basin is aeration which would volatilize any VOC's present in the wastewater to the atmosphere. The absence of VOC's in the basin would strongly suggest their absence in the groundwater due to the location of the wells. The absence of the other organic constituents in the basin effluent would also suggest their absence in the groundwater monitoring wells.

## 6.0 IMPACT ASSESSMENT

To determine the potential impact to groundwater from operation of the landfill, a statistical evaluation of the groundwater data was performed (Appendix C). This section provides a brief description of the evaluation methods and an assessment of the impact to groundwater from the landfill. The evaluation was based upon groundwater data summarized by Law Engineering. It was noted in the data summaries that only five constituents (total dissolved solids, chloride, chromium, iron, and manganese) periodically exceeded the groundwater quality standards (these exceedances are shaded in Table 1). Therefore, the evaluation of impact was limited to these constituents.

### 6.1 EVALUATION METHOD

Groundwater data from the Riegelwood facility was statistically analyzed to determine if down gradient wells (MW-4A, MW-5A, MW-7A, MW-8A) varied significantly from a "background" or up gradient well (MW-1A). Each well was analyzed for five compounds: total dissolved solids (TDS), chloride (Cl), chromium (Cr) iron (Fe), and manganese (Mn). The tests dated from 1988, and

a total of eleven tests were performed on all wells for each compound with the exception of chromium, which was not tested in 1988.

Each data set, meaning all tests performed for each compound per well, were first analyzed for normality or lognormality. This procedure was required to determine what type of statistical tool should be used to evaluate the data. Virtually all data sets were neither normal nor lognormal. Further review of the data indicated that one testing period, September 1993, had an anomalous report of chloride in well 1A and did not match results either before or after that event. Elimination of that data set from the analysis resulted in most of the data sets being classified as having a lognormal distribution. Specifically, all chloride and manganese data sets were lognormal, as were three of the five data sets for total dissolved solids. Therefore, the testing period was eliminated from the analysis. Most chromium data sets were nonparametric probably because greater than half of the tests were below detection limit. These tests were given a value of one-half the detection limit.

The mean of each data set and the 95% confidence interval was then determined for each data set. Normal and lognormal data sets were analyzed using common statistical practices, while all other data sets were analyzed using nonparametric analysis. Nonparametric analysis methods rank the test results from least to greatest and are based on the median of the data instead of the mean. The Environmental Protection Agency's "Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities" was used as the basis for this statistical evaluation.

## 6.2 EVALUATION RESULTS

The results of the evaluation are provided in Table 2 which lists the five constituents of concern, the mean concentration in each monitoring well for each constituent, and the concentration 95% confidence interval. In order to demonstrate an impact of the landfill on down gradient groundwater,

the 95% confidence interval for a given constituent in a down gradient well must exceed the 95% confidence interval for the up gradient or background well (the background well for the landfill would be MW-1A). In other words, if the range of values from the 95% confidence interval for one well have any overlap with the range of values for another well then the data sets have not been demonstrated to be different. Therefore when comparing up gradient and down gradient wells if the confidence intervals overlap, groundwater may have been impacted but the impact has not been demonstrated statistically.

Based on this approach the following results were obtained from an evaluation of groundwater monitoring wells around the landfill:

- The comparison of mean and 95% confidence intervals indicates that chloride ion concentration is greater than landfill background in downgradient wells MW-4A, MW-5A, and MW-7A. It also indicates that chloride ion concentration is greater in down gradient wells MW-5A and MW-7A than in down gradient wells MW-4A and MW-8A. This difference in down gradient groundwater quality is consistent for the other parameters as well. That is, wells MW-8A and MW-4A typically exhibit lower concentrations of analytes than wells MW-5A and MW-7A.

- The concentration of iron in the down gradient wells is within the range of the landfill up gradient well MW-1A. Therefore, the data does not demonstrate that the landfill or basin have affected the iron concentration in down gradient groundwater.

- The concentration of chromium in the down gradient wells is higher than in the up gradient well, but the groundwater standard (0.05 mg/l), is within the 95% confidence interval in the

down gradient wells. Therefore, the data does not demonstrate that concentrations of chromium in down gradient wells exceed the standard.

- Manganese concentration in the down gradient wells is greater than the concentration in the up gradient well MW-1A. The manganese concentration in the basin effluent (0.739 $\mu$g/l) is within the ranges observed in the down gradient wells.

- The total dissolved solids concentration in down gradient wells is greater than the concentration in the well MW-1A.

## 6.3 EVALUATION CONCLUSIONS

The following conclusions can be made from the statistical evaluation of groundwater monitoring data.

- Groundwater down gradient of the wastewater basin and landfill have been impacted to a very limited extent by chloride, manganese and total dissolved solids. The parameters exceed the groundwater quality standards but affect the aesthetic quality of the groundwater rather than create potential adverse health or environmental risks.

- The groundwater elevation data indicate that groundwater discharges to Livingston Creek and the Cape Fear River which are in close proximity to the down gradient monitoring wells. Any adverse impact to groundwater would be limited to a very small area bordering the Creek and River. This groundwater, in all likelihood, would never be used as a source of potable or process water.

- The concentrations of constituents observed in the wastewater basin effluent are within or greater than the range of those constituents observed in groundwater. Since both the groundwater and wastewater basin discharge to the Cape Fear River, the discharge of constituents such as chloride to the River from the groundwater would have negligible adverse impact especially considering the differences in flows (3750 gpd groundwater versus 40 mgd wastewater).

- The data does not demonstrate a difference in groundwater quality between the well closest to the landfill (MW-7A) and the well that is furthest from the landfill (MW-5A). Therefore, the data does not demonstrate that the landfill on its own has caused an exceedance of the groundwater quality standards.

Based upon the available data, the impacts to groundwater from the basin or landfill have been primarily of an aesthetic nature. Furthermore, the impacted groundwater would likely never be utilized as a source of process or drinking water. Continued operation of the landfill beyond January 1998 for disposal of material similar in nature to the contents already in place would likely not create any additional adverse impact to groundwater quality. Therefore, it is recommended that the Division of Solid Waste approve continued use of the landfill beyond January 1998.

## 7.0 PROPOSED PLAN

International Paper proposes to operate the existing landfill at its Riegelwood Mill under a new 5-year solid waste permit with an effective starting date in 1997. Under the new permit, it is intended to operate the landfill as a vertical expansion of the existing landfill. The intended waste stream to the landfill would consist of grits, dregs, fly ash, botton ash, woodyard waste, sludge, asbestos and general mill waste. The Mill sanitary waste stream will be disposed of in a permitted off-site sanitary

landfill. During operation of the vertical expansion, the Mill may remove some waste material which has high fuel value, such as wood chips, from the landfilll. These materials could be used as fuel in the Mill bark boilers. During and after operation of the expansion, it is intended to monitor groundwater quality in the landfill area in accordance with the new permit conditions. At the expiration date of the new permit or at a time when the landfill can no longer expand vertically, if sooner, the waste material will be contoured to provide stable side slopes and the waste would be covered with 2 feet of compacted soil designed to support a vegetative cover.

The unique location of the landfill and the relatively inert nature of the waste material would likely preclude any additional impact to the groundwater due to operation of the landfill after January 1, 1998. Installation of soil cover over the landfill would reduce leachate formation after closure and ensure further protection of the local groundwater.

# REFERENCES

1. *Statistical Analysis of Ground-Water Monitoring Data At RCRA Facilities, Interim Final Guidance,* Office of Solid Waste Management Division, U.S. Environmental Protection Agency, PB89-151047, April 1989.

2. *Statistical Analysis of Ground-Water Monitoring Data At RCRA Facilities, DRAFT Addendum to Interim Final Guidance,* Office of Solid Waste Permits and State Programs Division, U.S. Environmental Protection Agency, July 1992.

3. *Ground water Quality Assessment, Federal Paper Board Company, Inc. Riegelwood, North Carolina,* Law Environmental Job No. 59-7516, 1988.

FEDERAL

# FEDERAL PAPER BOARD COMPANY, INC.

RIEGELWOOD OPERATIONS
RIEGELWOOD, NORTH CAROLINA 28456
TELEPHONE 919 655-2211

November 20, 1981

RECEIVED
NOV 23 1981
SOLID & HAZARDOUS WASTE MANAGEMENT

Mr. Terry S. Dover
Eastern Area Supervisor
Solid and Hazardous Waste
Management Branch
P. O. Box 2091
Raleigh, North Carolina 27602

Re: Permit No. 24-02

Dear Mr. Dover:

As requested during your recent visit, I have updated the operating plans for our sanitary landfill operation and enclose same herewith.

As I stated during our discussion, the utilization of the extreme southern area of the landfill site by approaching by a different route would be quite expensive in terms of road building cost. My plans are to enter this area through a modification of the manner in which we are presently utilizing the area where we were standing on the site. This will require some time to develop, but should be completed by early spring.

Very truly yours,

FEDERAL PAPER BOARD COMPANY, INC.
Riegelwood Operations

M. T. White
M. T. White
Environmental Resources Supervisor

MTW/jg

Enclosure

cc: Messr. C. L. Bumgardner
L. C. Burchette
J. W. Cowand, Jr.
P. R. Kinsey
Project 5-175/B1
5-175/A1
G. Layton (Raleigh)
R. Church (Wilmington)

# SANITARY LANDFILL SITE INFORMATION

The sanitary landfill is located on the site of Federal Paper Board's Riegelwood pulp and paperboard mill. More particularly, the landfill site is a 45-acre peninsula extending eastward from the mill area into the waste treatment basin area. The site is bounded on all sides by either the basin or the mill's wastewater canals leading to the basin. Thus, any surface drainage from the site would flow into the treatment system. The treatment system discharge is permitted by the Division of Environmental Management.

Cover material for the landfill consists primarily of solids removed from the mill waste, bark, ashes and fly ash from boiler operations, residues of lime kiln and slaking operations, and miscellaneous soils resulting from mill operations. An excess of these materials exists, which is simply deposited in the area.

The access roads to the landfill site have gates which are closed at night to prevent unauthorized entry. The main roadway on the site is maintained as an all-weather road.

At the entrance to the site, a 4' x 8' sign containing all the information regarding the site, as required by DHS regulations, is posted and maintained.

The site is shown on the attached drawing of a portion of the mill site.

MTW/jg
11/13/81

State of North Carolina
Department of Environment,
Health and Natural Resources
Division of Waste Management

James B. Hunt, Jr., Governor
Wayne McDevitt, Secretary
William L. Meyer, Director

DEHNR

August 15, 1997

Mr. Joe Zuncich, R.E.P.
Environmental Resources Group Leader
International Paper
P.O. Box 8
Riegelwood, N.C. 28456

RE: Meeting of August 13, 1997, and RUST E&I Memo of August 14, for International Paper Industrial Landfill, Permit No.24-02

Dear Mr. Zuncich,

Thank you for the opportunity to meet with you and John Funk, of RUST E&I, this past Wednesday. I now have a greater appreciation for the conditions at the International Paper Landfill and the difficulty in demonstrating compliance with 15A NCAC 2L.

The Solid Waste Management Rules do not have provisions for a variance in complying with .0503(2)(d)(ii). If the landfill is to continue operating after January 1, 1998, then a groundwater protection demonstration must be made, according to (d)(ii)(A). This demonstration must not only show current compliance, but also demonstrate, based upon modeling, "a design that will ensure that the ground water standards established under 15A NCAC 2L *will not be exceeded* in the uppermost aquifer at the compliance boundary".

Because of the unusual location and design of the landfill on a peninsula surrounded by the waste water treatment basin (WWTB), it will be very difficult to make the required demonstration. Never the less, since the Solid Waste Management Rules require such a demonstration, this must be done in order for the landfill to continue to operate after January 1, 1998.

The existing detection monitoring system, which is located outside the WWTB, and beyond what would normally be the compliance boundary, currently indicates some constituents that exceed the 2L Groundwater Standards. Therefore it must be assumed that the landfill is not in compliance, unless it can be demonstrated that these exceedences are due to natural variability or a source other than the landfill (perhaps the WWTB).

I do not see any way to attempt demonstrating compliance without establishing ground-water monitoring wells on the peninsula between the waste boundary and the WWTB. (If necessary, these wells would have to be placed through wastes.) Extreme care would have to be taken to locate, design, and install these wells in such a manner so as not to spread potential contamination. Wells and piezometers would need to be located and designed so as to demonstrate the direction and rate of ground-water flow and provide representative water quality samples. At least one well nest would be necessary to determine the different hydraulic characteristics of the upper sand aquifer and the Pee Dee formation aquifer, to establish vertical gradients, and to determine existing water quality.

It appears to me this information is necessary before modeling can be done to attempt to demonstrate compliance with 2L. Even then, because of the technical difficulties involved, especially the difficulty of distinguishing between potential contaminants from the landfill and potential contaminants from the WWTB, it is questionable if compliance can be successfully demonstrated.

As stated in the December 6, 1996, letter to you from Jim Coffey, Supervisor of the Solid Waste Section Permitting Branch, the owner/operator shall submit the information necessary to complete the final determination of compliance with Rule .0503(2)(d)(ii) to the Section thirty (30) days prior to January 1, 1998. It may take some time for the Solid Waste Section to evaluate these submittals and make a final determination of compliance. However, as also stated in the 12-06-96 letter, the construction and operational plan shall be developed in one-year phases and operated in such a manner that the landfill may be closed at any time.

If a successful demonstration of compliance can be provided, there is the possibility that the landfill can continue to operate for an additional five years. However, if a successful demonstration can not be made, the landfill will have to cease operations and close in less than five years. It appears that International Paper should pursue other disposal options as soon as possible. If another landfill is to be permitted, every effort should be made to proceed with the permit application process as quickly as possible.

As we discussed, low permeability caps are generally required and sludge-soil mixtures are typically allowed only in the vegetative layer of the cap system. For additional information on final cover considerations and cap construction, you may wish to talk with one of our permitting engineers.

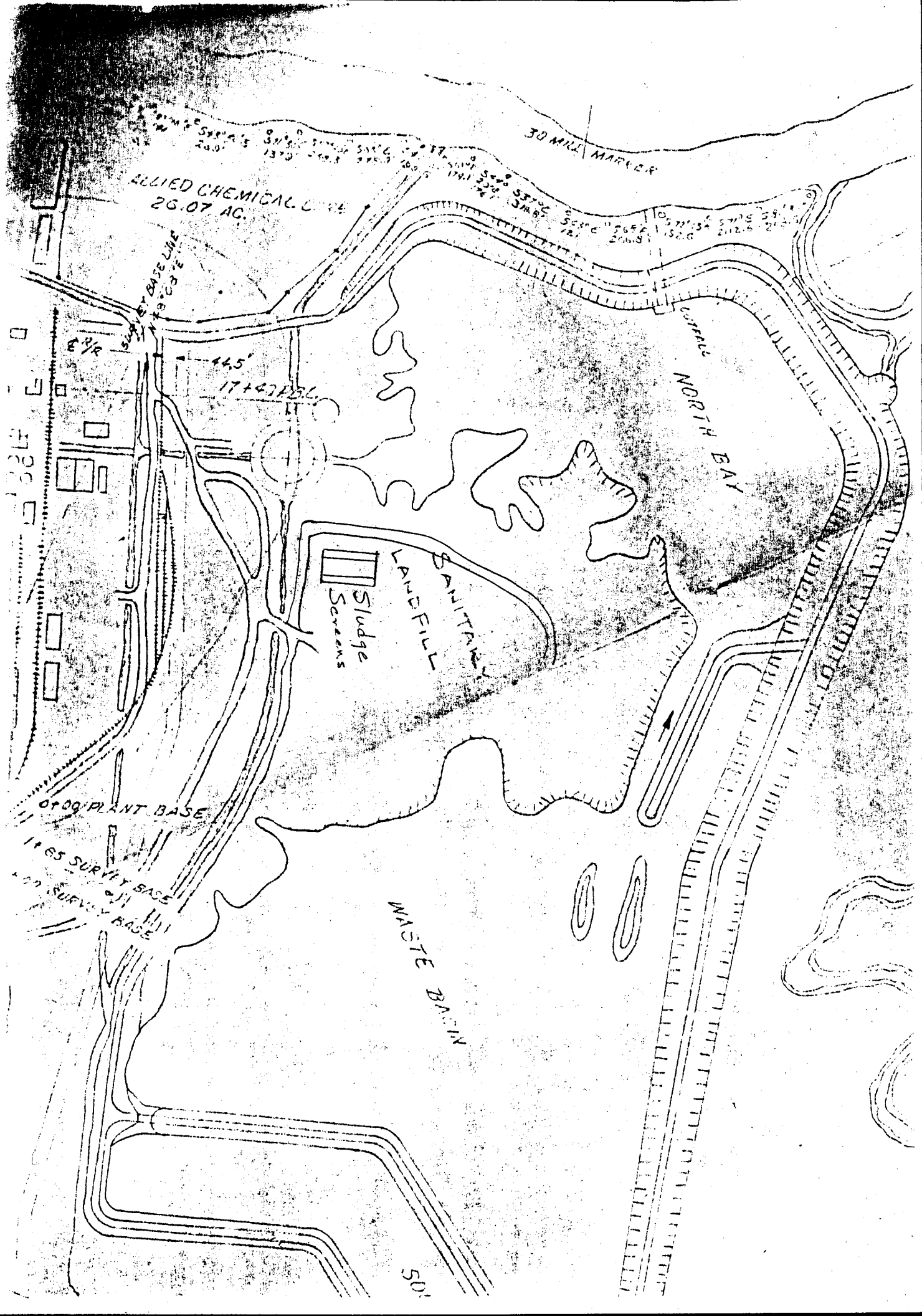
If you or your consultant have any questions about this letter, please call me at (919) 733-0692, extension 258.

Sincerely,

Bobby Lutfy

Bobby Lutfy
Hydrogeologist
Solid Waste Section

cc: Jim Coffey, Solid Waste Section
Susan Leistiko, Solid Waste Section
Ikie Guyton, SWS - Fayetteville
John Funk, RUST Environment & Infrastructure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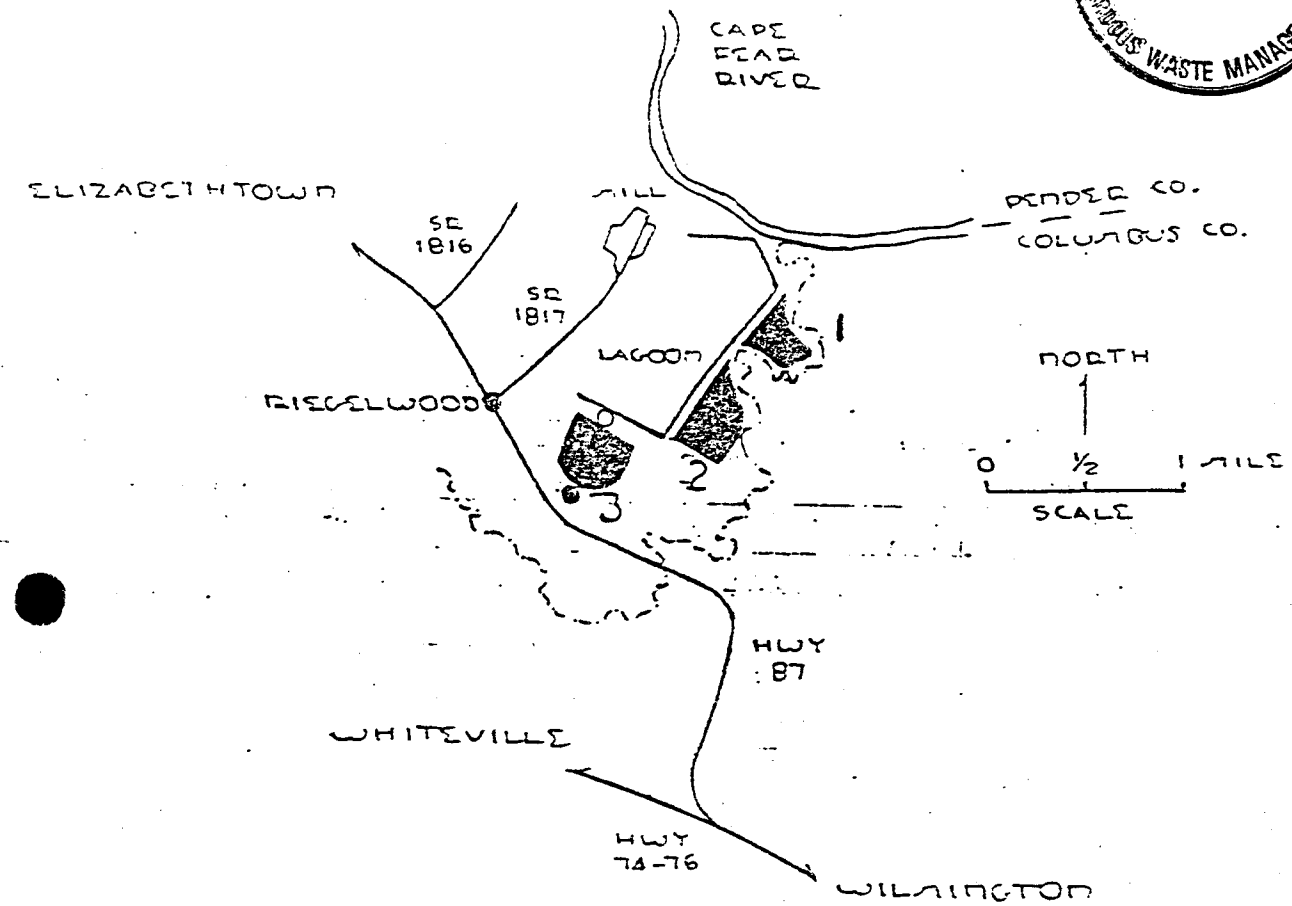
NORTH BAY
SANITARY LANDFILL
Sludge Screens
PLANT BASE
SURVEY BASE
SURVEY BASE
WASTE BASIN
50'

THAT SHOWS THE LOCATION OF THE PROPOSED
FEDERAL PAPER BOARD CO., INC., BIGGELWOOD,
COLUMBUS COUNTY

RECEIVED
JAN 14 1985
HAZARDOUS WASTE MANAGEMENT BRANCH




EXPLANATION:

■ — PROPOSED LOCATION OF LANDFILL

2 — REFERENCE NUMBER

O — PROPOSED LOCATION OF BACKGROUND MONITORING WELL (EXPOSE TO GA ZONE)

● — PROPOSED LOCATION OF MONITORING WELL (EXPOSE TO GA ZONE AND LOCATE AT PERIMETER OF COMPLIANCE)

LIVINGSTON CREEK

## TABLES

Table 1 - Groundwater Monitoring Parameters

Table 2 - Statistical Analysis

## DRAWINGS

37140-C-01 - INTERNATIONAL PAPER SITE MAP

37140-C-02 - LANDFILL AREA SITE MAP

37140-C-03 - GROUNDWATER FLOW DIRECTION

## APPENDICES

Appendix A - Waste stream TCLP Test Results

Appendix B - Landfill Monitoring Well Construction Records

Appendix C - Groundwater Statistical Evaluation Tables

TABLE 1
ANNUAL GROUND-WATER ANALYSIS RESULTS
INTERNATIONAL PAPER
RIEGELWOOD, NORTH CAROLINA

| PARAMETER | MONITORING WELL MW-1A | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1989 | 1990 | 1991 | 1992 | 1993 | 1993 | 1994 | 1994 | 1995 | 1995 | 1996 | NCAC STD. |
| | | | | | APR | SEPT | MAR | SEPT | APR | SEPT | APR | |
| BOD ppm | 4 | 1 | <1 | <1 | <1 | 10 | <1 | 1 | <1 | 1 | <1 | NS |
| COD ppm | 52 | 10 | 13 | 15 | 8 | 189 | 8 | 5 | <5 | <5 | 15 | NS |
| TOX, as Cl ppb | 22 | 9 | 6 | <5 | 13 | 27 | 18 | 22 | 20 | 21 | 23 | NS |
| TOC, as C ppm | 9.7 | 2.2 | 3.89 | 2.84 | 3.71 | 47.1 | 2.42 | 7.08 | 2.53 | 2.2 | 4.3 | NS |
| TDS ppm | 60 | 106 | 83 | 122 | 74 | 1394 | 83 | 94 | 98 | 95 | 93 | 500 |
| pH | 5.0 | 5.05 | 4.9 | 5 | 4.95 | 6.70 | 4.85 | 5.05 | 4.9 | 5 | 5 | 6.5-8.5 |
| Conductivity, umohs/cm | 106 | 115 | 115 | 134 | 147 | 2410 | 142 | 157 | 150 | 152 | 158 | NS |
| Sulfate Gravimetric, as S04 ppm | 25 | 25 | 26 | 27 | 32 | 35 | 41 | 29 | 39 | 35 | 44 | 250.0 |
| Chloride, as Cl ppm | 15 | 24 | 17 | 24 | 17 | 490 | 19 | 21 | 17 | 16 | 18 | 250.0 |
| Fluoride, as F ppm | .11 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | 2.0 |
| Nitrate, as NO3-N ppm | <0.10 | 0.26 | <0.1 | <0.1 | <0.1 | 1.23 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | 10.0 |
| Arsenic, as As ppm | 0.030 | <.005 | <.005 | <.005 | <.005 | .007 | <.005 | 0.01 | <0.005 | <.005 | <.005 | 0.05 |
| Barium, as Ba ppm | 0.710 | .050 | .090 | .11 | .065 | .155 | .045 | 0.05 | 0.045 | 0.04 | 0.08 | 1.0 |
| Cadmium, as Cd ppm | <0.15 | <.002 | <.005 | <.002 | <.002 | <.002 | <.002 | <.002 | <.002 | <.002 | <.002 | 0.005 |
| Chromium, as Cr ppm | 0.380 | <.005 | .045 | .050 | <.005 | .008 | <.005 | <.005 | <.005 | <.005 | <.005 | 0.05 |
| Copper, as Cu ppm | 0.240 | <.005 | .020 | .037 | .006 | .010 | .004 | .004 | <0.003 | <.003 | 0.014 | 1.0 |
| Iron, as Fe ppm | 48.0 | 500 | 7.20 | 4.60 | 3.65 | 7.3 | .65 | 0.83 | 0.75 | 0.93 | 2.05 | 0.3 |
| Lead, as Pb ppm | 0.380 | .040 | .040 | .035 | .015 | .004 | .004 | 0.005 | <0.003 | <.003 | 0.025 | 0.05 |
| Manganese, as Mn ppm | .200 | <.005 | .010 | .035 | .009 | .700 | .007 | 0.009 | 0.006 | 0.006 | 0.011 | 0.05 |
| Mercury, as Hg ppm | .0007 | <.0002 | <.0002 | .0002 | <.0002 | <.0002 | <.0002 | <.0002 | <.0002 | <.0002 | 0.0018 | 0.0011 |
| Selenium, as Se ppm | <.005 | <.005 | <.005 | .005 | <.005 | <.005 | <.005 | <.005 | <.005 | <.005 | <.005 | 0.01 |
| Silver, as Ag ppm | <.025 | <.002 | <.005 | <.002 | <.002 | <.002 | <.002 | <.002 | <.002 | <.002 | <.002 | 0.05 |
| Zinc, as Zn ppm | .180 | .015 | .240 | .025 | .015 | .030 | .013 | .013 | 0.018 | <.005 | 0.010 | 5.0 |

NOTES:
NCAC STD. - Title 15, North Carolina Administrative Code, Subchapter 2L, class GA groundwater standard.
Shaded values exceed the NCAC STD.
< Symbol = Below Laboratory Detectable Limits
ppm = Parts Per Million
NS = No current NCAC STAN is available
Refer to laboratory reports for actual sample dates
Summary data from Law Engineering Reports

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**ANNUAL GROUND-WATER ANALYSIS RESULTS**
**INTERNATIONAL PAPER**
**RIEGELWOOD, NORTH CAROLINA**

| PARAMETER | MONITORING WELL MW-1B | | | | | | | | | | | NCAC STD. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1989 | 1990 | 1991 | 1992 | 1993 | 1993 | 1994 | 1994 | 1995 | 1995 | 1996 | |
| | | | | | APR | SEPT | MAR | SEPT | APR | SEPT | APR | |
| BOD ppm | 60 | 3 | 2 | 7 | <1 | <1 | 6 | 6 | 3 | 3 | 10 | NS |
| COD ppm | 1308 | 32 | 41 | 131 | <5 | 6 | 281 | 61 | <5 | 68 | 34 | NS |
| TOX, as Cl ppb | 31 | 17 | ND | <5 | <5 | 18 | 10 | 18 | <5 | 11 | 6 | NS |
| TOC, as C ppm | 3.1 | 2.4 | 2.15 | 1.87 | 1.64 | 1.34 | 2.57 | 2.23 | 1.62 | 1.42 | 8.44 | NS |
| TDS ppm | 396 | 390 | 286 | 363 | 271 | 327 | 287 | 332 | 297 | 328 | 285 | 500 |
| pH | 7.45 | 7.15 | 7.8 | 7.6 | 7.60 | 7.40 | 7.45 | 7.3 | 7.5 | 7.2 | 7.4 | 6.5-8.5 |
| Conductivity, umohs/cm | 439 | 461 | 447 | 513 | 508 | 519 | 538 | 565 | 530 | 534 | 543 | NS |
| Sulfate Gravimetric, as S04 ppm | .36 | 32 | 34 | 33 | 32 | 33 | 27 | 32 | 37 | 40 | 40 | 250.0 |
| Chloride, as Cl ppm | 7 | 11 | 7 | 9 | 6 | 5 | 6 | 8 | 10 | 14 | 9 | 250.0 |
| Fluoride, as F ppm | .76 | 0.29 | 0.22 | .38 | 0.16 | 0.20 | .33 | q | 0.21 | 0.34 | 0.15 | 2.0 |
| Nitrate, as NO3-N ppm | .75 | <0.1 | <0.1 | .47 | 0.23 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | 0.1 | 10.0 |
| Arsenic, as As ppm | .028 | <.005 | .007 | .026 | .010 | <.005 | .006 | .012 | <0.005 | <.005 | <.005 | 0.05 |
| Barium, as Ba ppm | .910 | .090 | .070 | .165 | .045 | .040 | .12 | .080 | 0.045 | 0.09 | 0.05 | 1.0 |
| Cadmium, as Cd ppm | >0.15 | <.002 | <.005 | <.002 | <.002 | <.002 | <.002 | <.002 | <.002 | <.002 | <.002 | 0.005 |
| Chromium, as Cr ppm | .330 | <.005 | .04 | .110 | <.005 | <.005 | .015 | .010 | <.005 | 0.008 | <.005 | 0.05 |
| Copper, as Cu ppm | .220 | <.005 | .020 | .040 | <.005 | <.003 | .008 | .007 | <0.003 | 0.008 | <.003 | 1.0 |
| Iron, as Fe ppm | 380 | .750 | 26.5 | 72 | .130 | .080 | 22 | 8.00 | 2.4 | 15.00 | 2.40 | 0.3 |
| Lead, as Pb ppm | .220 | .023 | <.010 | .024 | <.003 | <.003 | 0.01 | 0.006 | <0.003 | <.003 | <.003 | 0.05 |
| Manganese, as Mn ppm | 3.50 | .050 | .200 | .65 | .035 | .035 | 5.7 | 0.3 | 0.11 | 0.35 | 0.11 | 0.05 |
| Mercury, as Hg ppm | <.0005 | <.0002 | <.0002 | <.0002 | <.0002 | <.0002 | <.0002 | <.0002 | <.0002 | <.0002 | .0026 | 0.0011 |
| Selenium, as Se ppm | .014 | <.005 | <.005 | .007 | <.005 | <.005 | <.005 | <.005 | <.005 | <.005 | <.005 | 0.01 |
| Silver, as Ag ppm | <.025 | <.002 | <.005 | <.002 | <.002 | <.002 | <.002 | <.002 | <.002 | <.002 | <.002 | 0.05 |
| Zinc, as Zn ppm | 1.50 | .01 | .076 | .220 | .005 | .010 | .295 | 0.07 | 0.03 | 0.105 | 0.019 | 5.0 |

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ppm = Parts Per Million
NS = No current NCAC STAN is available
Refer to laboratory reports for actual sample dates
Summary data from Law Engineering Reports

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**ANNUAL GROUND-WATER ANALYSIS RESULTS**
**INTERNATIONAL PAPER**
**RIEGELWOOD, NORTH CAROLINA**

| PARAMETER | MONITORING WELL MW-4A | | | | | | | | | | | NCAC STD. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1989 | 1990 | 1991 | 1992 | 1993 | 1993 | 1994 | 1994 | 1995 | 1995 | 1996 | |
| | | | | | APR | SEPT | MAR | SEPT | APR | SEPT | APR | |
| BOD ppm | 3 | 3 | 2 | | <1 | <1 | <1 | 4 | <1 | <1 | 2 | NS |
| COD ppm | 46 | 62 | 22 | 19 | 12 | 9 | 10 | 15 | 18 | 10 | 32 | NS |
| TOX, as Cl ppb | 21 | 12 | 9 | 5 | 16 | 23 | 60 | 33 | 37 | 43 | 33 | NS |
| TOC, as C ppm | 4.0 | 3.5 | 4.76 | 4.67 | 3.97 | 2.61 | 2.99 | 4.96 | 4.57 | 3.6 | 7.2 | NS |
| TDS ppm | 89 | 166 | 183 | 276 | 197 | 170 | 410 | 114 | 266 | 179 | 242 | 500 |
| pH | 5.6 | 5.40 | 5.2 | 5.25 | 5.80 | 5.15 | 5.2 | 5.15 | 5.5 | 5.2 | 5.2 | 6.5-8.5 |
| Conductivity, umohs/cm | 136 | 184 | 289 | 276 | 385 | 246 | 248 | 198 | 460 | 271 | 419 | NS |
| Sulfate Gravimetric, as S04 ppm | 41 | 34 | 69 | 67 | 96 | 67 | 45 | 45 | 114 | 67 | 118 | 250.0 |
| Chloride, as Cl ppm | 23 | 37 | 50 | 38 | 34 | 25 | 25 | 21 | 45 | 32 | 41 | 250.0 |
| Fluoride, as F ppm | <.05 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | 2.0 |
| Nitrate, as NO3-N ppm | <0.10 | 0.24 | <0.1 | 0.30 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | 10.0 |
| Arsenic, as As ppm | .010 | <.005 | <.005 | <.005 | <.005 | <.005 | <.005 | 0.01 | <.005 | <.005 | <.005 | 0.05 |
| Barium, as Ba ppm | 230 | .050 | .120 | .085 | .050 | .040 | .045 | .04 | 0.09 | 0.055 | 0.09 | 1.0 |
| Cadmium, as Cd ppm | <.015 | <.002 | <.005 | <.002 | <.002 | <.002 | <.002 | <.002 | <.002 | <.002 | <.002 | 0.005 |
| Chromium, as Cr ppm | .120 | <.005 | .020 | .017 | <.005 | <.005 | <.005 | <.005 | <.005 | <.005 | <.005 | 0.05 |
| Copper, as Cu ppm | .040 | <.005 | .008 | .017 | <.003 | <.003 | <.003 | 0.003 | <0.003 | <.003 | 0.005 | 1.0 |
| Iron, as Fe ppm | 40.0 | 8.25 | 32.5 | 28.0 | 13.5 | 3.60 | 8.9 | 7.6 | 12 | 12.3 | 9.4 | 0.3 |
| Lead, as Pb ppm | <.025 | .003 | <.010 | .005 | <.003 | <.003 | <.003 | 0.004 | <0.003 | <.003 | 0.004 | 0.05 |
| Manganese, as Mn ppm | .150 | .050 | .100 | .1 | 0.080 | 0.50 | .055 | 0.045 | 0.1 | 0.065 | 0.105 | 0.05 |
| Mercury, as Hg ppm | .0005 | <.0002 | <.0002 | <.0002 | <.0002 | <.0002 | <.0002 | <.0002 | <.0002 | <.0002 | 0.0004 | 0.0011 |
| Selenium, as Se ppm | <.005 | <.005 | <.005 | <.005 | .005 | <.005 | <.005 | <.005 | <.005 | <.005 | <.005 | 0.01 |
| Silver, as Ag ppm | <.025 | <.002 | <.005 | <.002 | <.002 | <.002 | <.002 | <.002 | <.002 | <.002 | <.002 | 0.05 |
| Zinc, as Zn ppm | 0160 | .010 | .050 | .030 | .007 | .040 | .025 | 0.015 | 0.075 | 0.015 | 0.020 | 5.0 |

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ppm = Parts Per Million
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Summary data from Law Engineering Reports

**TABLE NO. 1 - Continued**
**ANNUAL GROUND-WATER ANALYSIS RESULTS**
**INTERNATIONAL PAPER**
**RIEGELWOOD, NORTH CAROLINA**

| PARAMETER | MONITORING WELL MW-5A | | | | | | | | | | | NCAC STD. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1989 | 1990 | 1991 | 1992 | 1993 | 1993 | 1994 | 1994 | 1995 | 1995 | 1996 | |
| | | | | | APR | SEPT | MAR | SEPT | APR | SEPT | APR | |
| BOD ppm | 15 | 5 | 3 | 3 | * | <1 | 3 | 8 | 24 | 7 | 38 | NS |
| COD ppm | 139 | 74 | 166 | 115 | 218 | 7 | 75 | 87 | 225 | 207 | 465 | NS |
| TOX, as Cl ppb | 252 | 340 | 1300 | 563 | 1516 | 964 | 576 | 732 | 2479 | 2528 | 1876 | NS |
| TOC, as C ppm | 58 | 31.3 | 46.6 | 27.6 | 68.4 | 2.36 | 21.7 | 5.87 | 62.8 | 47.7 | 72.3 | NS |
| TDS ppm | 852 | 1618 | 1318 | 748 | 1820 | 107 | 114 | 437 | 1770 | 1760 | 1730 | 500 |
| pH | 7.0 | 7.15 | 6.7 | 6.8 | 6.65 | 4.95 | 6.6 | 6.65 | 6.7 | 6.7 | 6.65 | 6.5-8.5 |
| Conductivity, umohs/cm | 945 | 1423 | 1944 | 803 | 3631 | 133 | 1430 | 837 | 3650 | 3020 | 3420 | NS |
| Sulfate Gravimetric, as S04 ppm | 11 | 12 | 44 | 43 | 13 | 47 | 81 | 24 | 21 | 38 | 6 | 250.0 |
| Chloride, as Cl ppm | 122 | 138 | 369 | 121 | 713 | 16 | 194 | 112 | 514 | 573 | 607 | 250.0 |
| Fluoride, as F ppm | .12 | 0.20 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | 2.0 |
| Nitrate, as NO3-N ppm | .29 | 0.22 | .60 | 0.37 | <0.1 | <0.1 | <0.1 | <0.1 | 0.68 | 1.76 | 0.9 | 10.0 |
| Arsenic, as As ppm | .015 | .009 | .006 | .007 | .018 | <.005 | <.005 | 0.014 | <0.005 | 0.006 | 0.006 | 0.05 |
| Barium, as Ba ppm | .170 | .150 | .220 | .135 | .190 | .045 | .08 | 0.08 | 0.18 | 0.16 | 0.27 | 1.0 |
| Cadmium, as Cd ppm | <.015 | <.002 | <.005 | <.002 | <.002 | <.002 | <.002 | <.002 | <.002 | <.002 | <.002 | 0.005 |
| Chromium, as Cr ppm | .080 | .008 | .050 | .050 | .011 | <.005 | <.005 | 0.011 | 0.013 | 0.009 | 0.055 | 0.05 |
| Copper, as Cu ppm | <0.25 | <.005 | .010 | .017 | .010 | <.003 | <.003 | 0.004 | 0.005 | 0.007 | 0.016 | 1.0 |
| Iron, as Fe ppm | 38.0 | 3.50 | 27.0 | 18.0 | 16.0 | 87.0 | 9.2 | 6.60 | 7 | 5 | 14 | 0.3 |
| Lead, as Pb ppm | <.025 | .016 | <.010 | .011 | .004 | <.003 | .003 | .008 | 0.003 | <.003 | 0.025 | 0.05 |
| Manganese, as Mn ppm | .580 | .400 | .560 | .380 | .800 | .008 | .39 | 0.3 | 0.55 | 0.65 | 0.745 | 0.05 |
| Mercury, as Hg ppm | <.0005 | <.0002 | <.0002 | <.0002 | <.0002 | <.0002 | <.0002 | <.0002 | <.0002 | <.0002 | 0.0003 | 0.0011 |
| Selenium, as Se ppm | <.005 | <.005 | <.005 | <.005 | <.005 | <.005 | <.005 | <.005 | <.005 | <.005 | <.005 | 0.01 |
| Silver, as Ag ppm | <.025 | <.002 | <.005 | <.002 | <.002 | <.002 | <.002 | <.002 | <.002 | <.002 | <.002 | 0.05 |
| Zinc, as Zn ppm | .040 | .006 | .025 | .020 | .007 | .009 | .020 | 0.017 | 0.011 | <.005 | 0.015 | 5.0 |

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ppm = Parts Per Million
NS = No current NCAC STAN is available
Refer to laboratory reports for actual sample dates
Summary data from Law Engineering Reports

**TABLE NO. 1 - Continued**
**ANNUAL GROUND-WATER ANALYSIS RESULTS**
**INTERNATIONAL PAPER**
**RIEGELWOOD, NORTH CAROLINA**

| PARAMETER | MONITORING WELL MW-7A | | | | | | | | | | | NCAC STD. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1989 | 1990 | 1991 | 1992 | 1993 | 1993 | 1994 | 1994 | 1995 | 1995 | 1996 | |
| | | | | | APR | SEPT | MAR | SEPT | APR | SEPT | APR | |
| BOD ppm | 16 | 7 | 2 | 9 | * | 2 | 3 | 4 | 13 | 2 | 5 | NS |
| COD ppm | 491 | 124 | 140 | 150 | 206 | 99 | 87 | 71 | 31 | 100 | 101 | NS |
| TOX, as Cl ppb | 847 | 1470 | 2100 | 1091 | 910 | 1189 | 1026 | 1135 | 1352 | 1586 | 1011 | NS |
| TOC, as C ppm | 30 | 7.8 | 26.3 | 30.0 | 26.9 | 21.3 | 21 | 24.7 | 25.7 | 19.7 | 28.0 | NS |
| TDS ppm | 1462 | 1602 | 1019 | 1345 | 1030 | 1035 | 808 | 1030 | 1090 | 1150 | 1140 | 500 |
| pH | 6.5 | 6.70 | 6.8 | 6.9 | 6.70 | 6.70 | 6.5 | 6.65 | 6.7 | 6.65 | 6.5 | 6.5-8.5 |
| Conductivity, umohs/cm | 1969 | 2457 | 568 | 2469 | 2030 | 1837 | 1650 | 1940 | 1990 | 2030 | 2010 | NS |
| Sulfate Gravimetric, as S04 ppm | <10 | <10 | <10 | <10 | 2 | <2 | 3 | 3 | 13 | 20 | <1 | 250.0 |
| Chloride, as Cl ppm | 540 | 496 | 383 | 539 | 414 | 433 | 330 | 391 | 396 | 430 | 430 | 250.0 |
| Fluoride, as F ppm | .23 | 0.18 | 0.18 | .15 | .15 | .16 | .11 | .15 | 0.11 | <0.1 | <0.1 | 2.0 |
| Nitrate, as NO3-N ppm | .27 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | 10.0 |
| Arsenic, as As ppm | .041 | .019 | .022 | .025 | .013 | .016 | .014 | .025 | 0.019 | 0.018 | 0.03 | 0.05 |
| Barium, as Ba ppm | .340 | .110 | .120 | .120 | .060 | .060 | .045 | .060 | 0.055 | 0.055 | 0.085 | 1.0 |
| Cadmium, as Cd ppm | <.015 | <.002 | <.005 | <.002 | <.002 | <.002 | <.002 | <.002 | <.002 | <.002 | <.002 | 0.005 |
| Chromium, as Cr ppm | .210 | .005 | .075 | .065 | <.005 | .007 | <.005 | .007 | <.006 | <.005 | 0.010 | 0.05 |
| Copper, as Cu ppm | .070 | <.005 | .020 | .030 | .008 | .005 | .003 | .005 | 0.004 | 0.004 | 0.010 | 1.0 |
| Iron, as Fe ppm | 133 | 23.0 | 58.0 | 64.0 | 38.0 | 41.0 | 35.5 | 33.5 | 41 | 40.5 | 60.0 | 0.3 |
| Lead, as Pb ppm | <.025 | .012 | .010 | .008 | <.003 | <.003 | <.003 | <.004 | <.003 | <.003 | 0.005 | 0.05 |
| Manganese, as Mn ppm | 1.70 | .875 | .800 | .950 | .850 | .890 | .565 | .630 | 0.55 | 0.75 | 0.735 | 0.05 |
| Mercury, as Hg ppm | <.0005 | <.0002 | <.0002 | <.0002 | <.0002 | <.0002 | <.0002 | <.0002 | <.0002 | <.0002 | 0.0007 | 0.0011 |
| Selenium, as Se ppm | .007 | <.005 | <.005 | .005 | <.005 | <.005 | <.005 | <.005 | <.005 | <.005 | <.005 | 0.01 |
| Silver, as Ag ppm | <.025 | <.002 | <.005 | <.002 | <.002 | <.002 | <.002 | <.002 | <.002 | <.002 | <.002 | 0.05 |
| Zinc, as Zn ppm | .350 | .010 | .100 | .065 | .030 | .011 | .04 | .030 | 0.02 | <.005 | 0.030 | 5.0 |

NOTES:
NCAC STD. - Title 15, North Carolina Administrative Code, Subchapter 2L, class GA groundwater standard.
Shaded values exceed the NCAC STD.
< Symbol = Below Laboratory Detectable Limits
ppm = Parts Per Million
NS = No current NCAC STAN is available
Refer to laboratory reports for actual sample dates
Summary data from Law Engineering reports

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ANNUAL GROUND-WATER ANALYSIS RESULTS
INTERNATIONAL PAPER
RIEGELWOOD, NORTH CAROLINA

| PARAMETER | MONITORING WELL MW-8A | | | | | | | | | | | NCAC STD. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1989 | 1990 | 1991 | 1992 | 1993 | 1993 | 1994 | 1994 | 1995 | 1995 | 1996 | |
| | | | | | APR | SEPT | MAR | SEPT | APR | SEPT | APR | |
| BOD ppm | 5 | 4 | 4 | 4 | <1 | <1 | 2 | 2 | 2 | 1 | 2 | NS |
| COD ppm | 191 | 74 | 87 | 73 | 5 | 18 | 95 | 79 | 95 | 19 | 27 | NS |
| TOX, as Cl ppb | 89 | 10 | 7 | <5 | 27 | 18 | 6 | <5 | 15 | 28 | 17 | NS |
| TOC, as C ppm | 3.1 | 4.0 | 2.58 | 1.99 | 1.64 | 1.72 | 1.86 | 2.38 | 2.23 | 1.42 | 3.34 | NS |
| TDS ppm | 424 | 454 | 391 | 465 | 418 | 439 | 809 | 477 | 464 | 492 | 430 | 500 |
| pH | 7.75 | 7.30 | 7.5 | 7.6 | 7.20 | 7.25 | 7.45 | 7.05 | 7.3 | 7.15 | 7 | 6.5-8.5 |
| Conductivity, umohs/cm | 508 | 606 | 1840 | 621 | 707 | 680 | 705 | 762 | 727 | 756 | 687 | NS |
| Sulfate Gravimetric, as S04 ppm | 125 | 120 | 135 | 168 | 138 | 167 | 146 | 155 | 131 | 158 | 133 | 250.0 |
| Chloride, as Cl ppm | 13 | 17 | 17 | 14 | 11 | 12 | 10 | 12 | 12 | 9 | 14 | 250.0 |
| Fluoride, as F ppm | .28 | 0.20 | 0.26 | .22 | .11 | .14 | .12 | .12 | 0.12 | 0.13 | <0.1 | 2.0 |
| Nitrate, as NO3-N ppm | .30 | <0.1 | <0.1 | 0.25 | .15 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | 10.0 |
| Arsenic, as As ppm | .026 | <.005 | .021 | .015 | <.005 | <.005 | ,.005 | .014 | 0.006 | <.005 | <.005 | 0.05 |
| Barium, as Ba ppm | .290 | .120 | .190 | .190 | .075 | .085 | .08 | .014 | 0.155 | 0.100 | 0.090 | 1.0 |
| Cadmium, as Cd ppm | >.015 | <.002 | <.005 | <.002 | <.002 | <.002 | <.002 | <.002 | <.002 | <.002 | <.002 | 0.005 |
| Chromium, as Cr ppm | .150 | <.005 | .140 | .080 | <.005 | <.005 | <.005 | .011 | 0.01 | <.005 | <.005 | 0.05 |
| Copper, as Cu ppm | .050 | <.005 | .030 | .030 | <.003 | <.003 | .003 | .010 | 0.005 | 0.004 | 0.003 | 1.0 |
| Iron, as Fe ppm | 70.0 | .980 | 66.0 | 38.0 | .920 | .765 | 3.3 | 6.8 | 12 | 6.4 | 4.9 | 0.3 |
| Lead, as Pb ppm | <.025 | .003 | .030 | .018 | <.003 | <.003 | .003 | .009 | 0.007 | <.003 | 0.003 | 0.05 |
| Manganese, as Mn ppm | .780 | <.230 | .575 | .400 | 125 | .205 | .17 | 0.340 | 0.485 | 0.250 | 0.150 | 0.05 |
| Mercury, as Hg ppm | <.0005 | <.0002 | <.0002 | <.0002 | <.0002 | <.0002 | <.0002 | <.0002 | <.0002 | <.0002 | 0.0004 | 0.0011 |
| Selenium, as Se ppm | .007 | <.005 | <.005 | .006 | <.005 | <.005 | <.005 | <.005 | <.005 | <.005 | <.005 | 0.01 |
| Silver, as Ag ppm | <.025 | <.002 | <.005 | <.002 | <.002 | <.002 | <.002 | <.002 | <.002 | <.002 | <.002 | 0.05 |
| Zinc, as Zn ppm | .230 | .009 | .175 | .130 | .007 | .009 | .03 | .090 | 0.095 | 0.030 | 0.030 | 5.0 |

NOTES:
NCAC STD. - Title 15, North Carolina Administrative Code, Subchapter 2L, class GA groundwater standard.
Shaded values exceed the NCAC STD.
< Symbol = Below Laboratory Detectable Limits
ppm = Parts Per Million
NS = No current NCAC STAN is available
Refer to laboratory reports for actual sample dates
Summary data from Law Engineering Reports

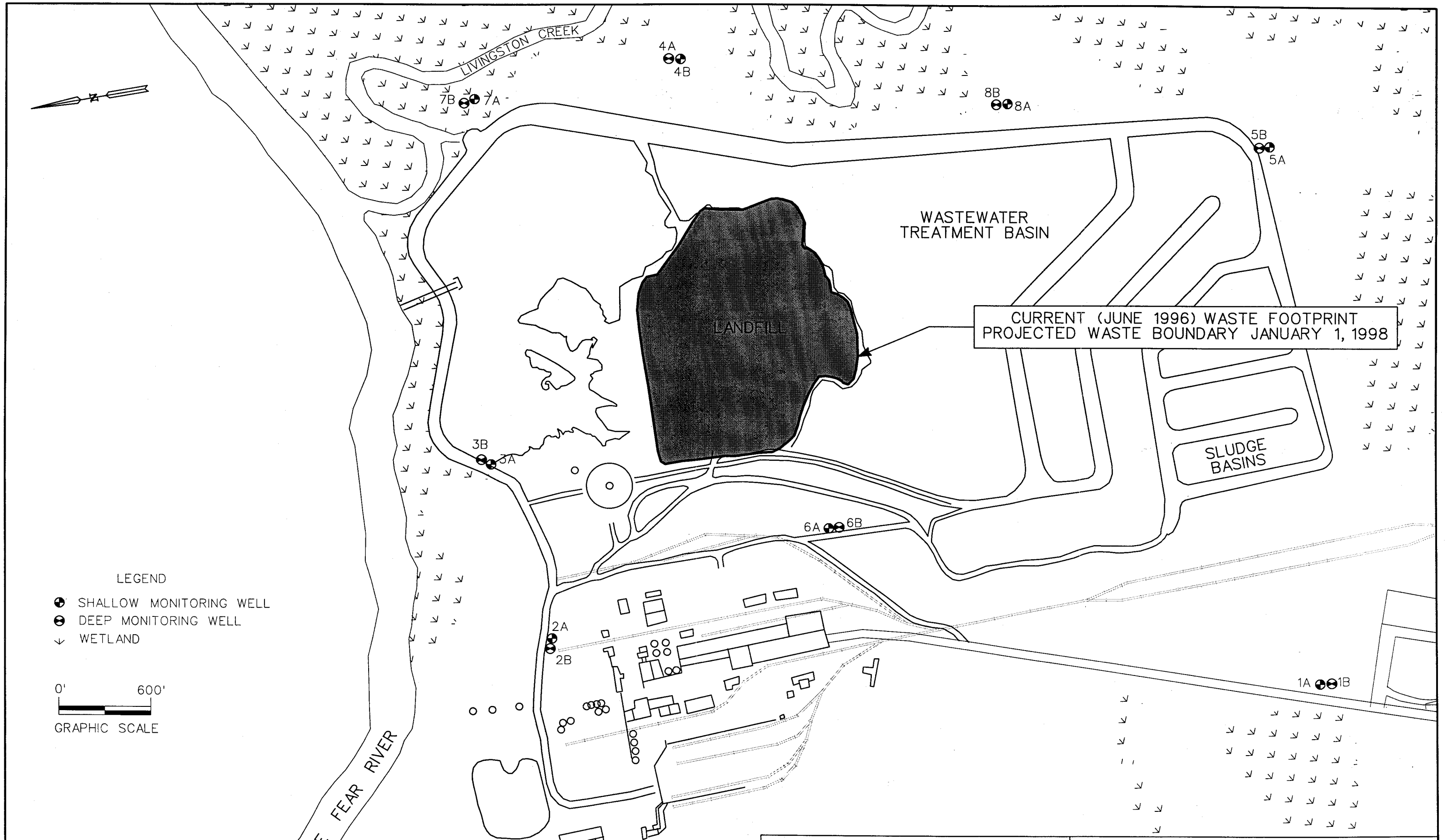
## TABLE 2

### Statistical Analysis (excluding September 1993 data)

### Mean and 95% Confidence Interval
### (Concentrations in $\mu$g/l)

| Well | MW-1A | | | MW-4A | | | MW-5A | | | MW-7A | | | MW-8A | | | Groundwater Standards |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | low | mean | high | low | mean | high | low | mean | high | low | mean | high | low | mean | high | |
| TDS | 79 | 92 | 108 | 132 | 183 | 255 | 772 | 1196 | 1620 | 999 | 1142 | 1305 | 391 | 454* | 492 | 500 |
| Cl | 16 | 18 | 20 | 21 | 30 | 42 | 166 | 278 | 465 | 384 | 427 | 475 | 11 | 13 | 15 | 250 |
| Fe | 0.4 | 1.5 | 5.4 | 3.0 | 9.2 | 28.2 | 3.9 | 8.7 | 19.0 | 5.7 | 25.2 | 111.0 | 1.2 | 5.3 | 22.8 | 0.3 |
| Cr | 0.0025 | 0.0025* | 0.05 | 0.0025 | 0.0025* | 0.02 | 0.01 | 0.02 | 0.04 | 0.0025 | 0.0065* | 0.21 | 0.0025 | 0.00625* | 0.14 | 0.05 |
| Mn | 0.01 | 0.01* | 0.04 | 0.05 | 0.07 | 0.10 | 0.40 | 0.52 | 0.64 | 0.57 | 0.75* | 0.88 | 0.12 | 0.24 | 0.48 | 0.05 |

*The mean value for these compounds are actually the median because the data was not normal or lognormal; therefore nonparametric analysis was performed.



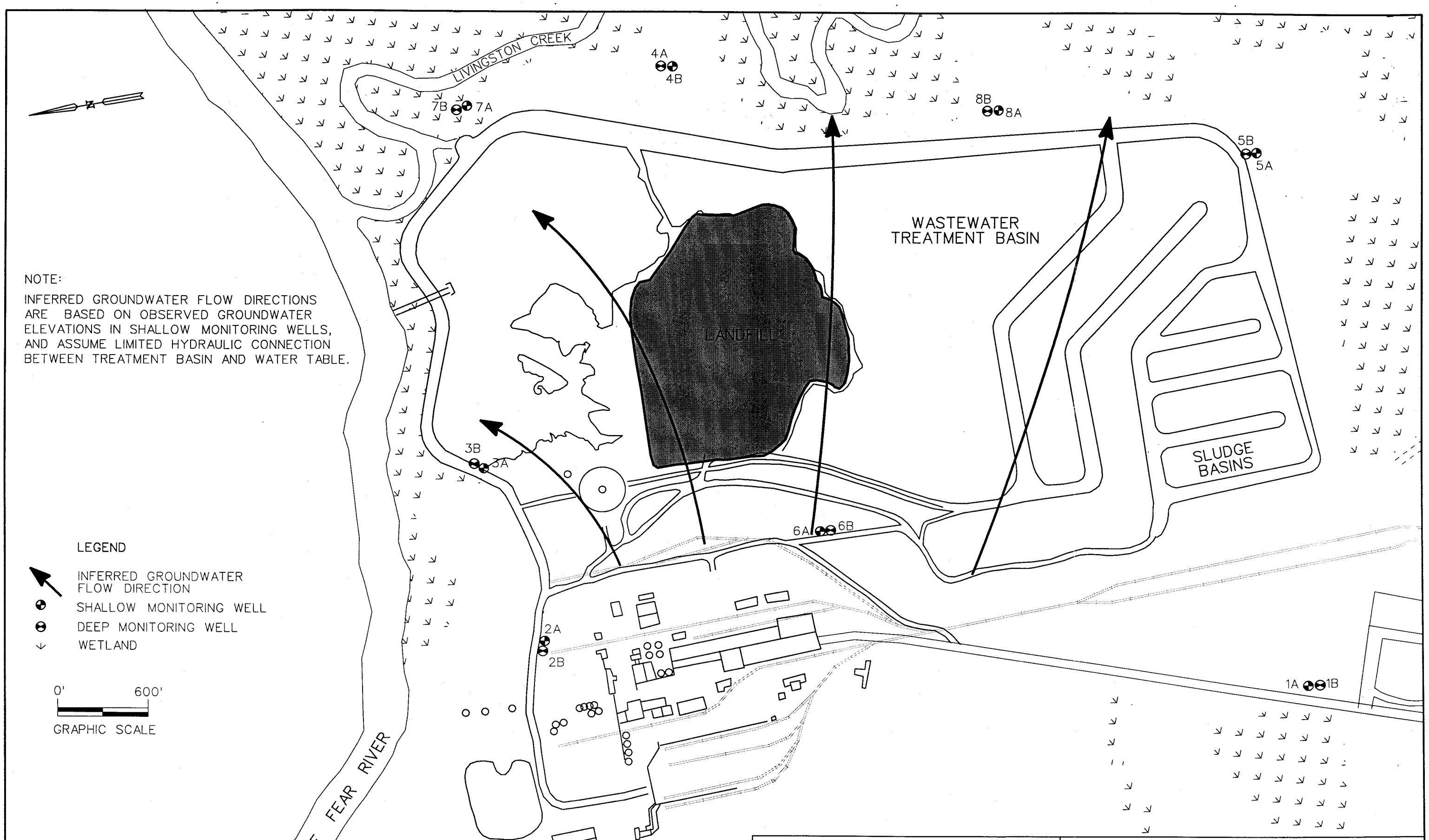

RUST ENVIRONMENT & INFRASTRUCTURE

DRAWING NO. 37140-C-02

LANDFILL AREA SITE MAP

INTERNATIONAL PAPER

PROJECT NO. 37140.000




RUST ENVIRONMENT & INFRASTRUCTURE

DRAWING NO. 37140-C-03

GROUNDWATER FLOW DIRECTION

INTERNATIONAL PAPER

PROJECT NO. 37140.000

# Appendix - A

# Appendix - A

# APPENDIX A

## WASTE STREAM TCLP TEST RESULTS

**(Dregs, Grits, Sludge, Old Lime Mud Pond, New Lime Mud Pond, Power Boiler Ash)**

IEA, Inc.
3000 Weston Parkway
Cary, NC 27513

Phone 919-677-0090
Fax 919-677-0427

IEA
An Aquarion Company

May 8, 1996

Pat Wynne
Federal Paperboard Company
John L. Riegel Road
Riegelwood, NC 28456

IEA Project No.: 979028/96043259, 9604260
IEA Reference No.: W9603638
Client Project I.D.: Waste Stream Characteristics

Dear Mr. Wynne,

Transmitted herewith are the results of analyses on six samples submitted to our laboratory.

The samples were received intact.

Analyses were performed according to approved methodologies and meet the requirements of the IEA Quality Assurance Program except where noted. Please see the enclosed reports for your results and a copy of the Chain of Custody documentation.

Thank you for selecting IEA for your sample analysis. Please do not hesitate to call me at 1-919-677-0090 or 1-800-444-9919 should you have any questions regarding this report. We look forward to serving you in the future.

Very truly yours,

IEA, Inc.

S Alex for
Rodney Raimonde
Project Manager

IEA, Inc.
3000 Weston Parkway
Cary, NC 27513

Phone 919-677-0090
Fax 919-677-0427

IEA
An Aquarion Company

# IEA-NORTH CAROLINA CERTIFICATIONS

| Certifying State | Program Type | Lab ID # |
|---|---|---|
| Alabama | DW | 40210 |
| California | DW, WW, HW<br>Radiolog. | I-1035,1768, I-1047<br>I-1018 (Rad) |
| Connecticut | DW, WW | PH-0135 |
| Florida | DW<br>WW<br>(CompQAP) | 87350<br>E87439<br>QAP#930007G |
| Kansas | DW, HW, WW | E-158 (DW, WW)<br>E-1189 (HW) |
| Kentucky | DW | 90049 |
| Massachusetts | DW, WW | M-NC039 |
| New Jersey | DW, WW<br>Radiolog. | 67719<br>67681 |
| New York | Radiolog. | 11422 |
| North Carolina | DW<br>WW<br>Radiolog. | DW 37720<br>WW 84<br>Rad 37720 |
| Ohio | Voluntary Action Program | CL00021 |
| South Carolina | DW<br>WW<br>HW | 99021 |
| Tennessee | DW<br>UST App List | 02914 |
| Utah | Radiolog.<br>RCRA | E-206<br>E-226 |
| Virginia | DW | 00179 |
| West Virginia | DW | 9908C |
| Wisconsin | WW | 998051010 |

DW=Drinking Water WW=Wastewater HW=Hazardous Waste Radiolog.=Radiological

Rev5.01/96

IEA
An Aquarion Company
3000 WESTON PKWY.
CARY, N.C. 27513
PH # 919-677-0090
FAX # 919-677-0427

# CHAIN OF CUSTODY RECORD

NO. 66991

**REGULATORY CLASSIFICATION - PLEASE SPECIFY**

☐ NPDES ☐ DRINKING WATER ☐ RCRA ☒ OTHER _____

Page 1 of 1

COMPANY: INTERNATIONAL PAPER

PROJECT #:

PROJECT NAME: WASTE STREAM CHARACTERIZATION

SAMPLERS: (SIGNATURE) [signature]

| SAMPLE I.D. | DATE | TIME | COMP | GRAB | STATION LOCATION | # OF CONTAINERS | MATRIX SOIL | MATRIX WATER | REQUESTED PARAMETERS: FULL TCLP |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 4/8 | | | X | DREGS | | X | | X |
| 2 | 4/8 | | | X | GRITS | | X | | X |
| 3 | 4/8 | | | X | SLUDGE | | | X | X |
| 4 | 4/8 | | | X | OLD LIME MUD POND | | X | | X |
| 5 | 4/8 | | | X | NEW LIME MUD POND | | X | | X |
| 6 | 4/8 | | | X | POWER BOILER ASH | | X | | X |

| RELINQUISHED BY (SIGNATURE) | DATE | TIME | RECEIVED BY | DATE | TIME |
|---|---|---|---|---|---|
| [signature] | 4/9/90 | | | | |

| RELINQUISHED BY (SIGNATURE) | DATE | TIME | RECEIVED FOR LAB BY | DATE | TIME |
|---|---|---|---|---|---|
| | | | S. Pa[illegible] | 4/10/90 | 0930 |

| IEA QUOTE NO. | IEA RUSH NO. |
|---|---|
| | |
| **PROJECT MANAGER (PLEASE PRINT)** | **P.O. NO.** |
| | |

**REMARKS ON SAMPLE RECEIPT**

☒ BOTTLE INTACT ☐ CUSTODY SEALS
☐ PRESERVED ☐ SEALS INTACT
☒ CHILLED ☐ SEE REMARKS

**IEA REMARKS**

4°C 979-[illegible]

**FIELD REMARKS**

Industrial & Environmental Analysts, Inc. (IEA)
TCLP REGULATED
BASE/NEUTRAL/ACID EXTRACTABLES SW-846 METHOD 8270

| | | | |
|---|---|---|---|
| IEA Project Number: | 979-028 | | |
| IEA Sample Number: | 9604259-01 | Date Received: | 04/10/96 |
| Client Name: | Federal Paperboard Co. | Date Sampled: | 04/08/96 |
| Client Project I.D.: | Waste Stream Characteristics | Date Extracted: | 04/19/96 |
| Sample Identification: | 1 DREGS FPW | Date Analyzed: | 04/22/96 |
| Matrix: | Leachate | Analysis By: | Van Lare |
| TCLP Extraction Date: | 04/17/96 | Dilution Factor: | 1.0 |

| Number | Compound | N.C. Regulatory Level (mg/L) | Quantitation Limit (mg/L) | Results Concentration (mg/L) |
|---|---|---|---|---|
| 1 | 1,4-Dichlorobenzene | 0.75 | 0.010 | BQL |
| 2 | 2,4-Dinitrotoluene | 0.013 | 0.010 | BQL |
| 3 | Hexachlorobutadiene | 0.05 | 0.010 | BQL |
| 4 | Hexachloroethane | 0.30 | 0.010 | BQL |
| 5 | Total Cresol | 20 | 0.010 | BQL |
| 6 | Nitrobenzene | 0.20 | 0.010 | BQL |
| 7 | Pentachlorophenol | 10 | 0.050 | BQL |
| 8 | Pyridine | 0.50 | 0.010 | BQL |
| 9 | 2,4,5-Trichlorophenol | 40 | 0.010 | BQL |
| 10 | 2,4,6-Trichlorophenol | 0.20 | 0.010 | BQL |
| 11 | Hexachlorobenzene | 0.013 | 0.010 | BQL |

Comments:
Sample specific quantitation limits may be calculated by multiplying the quantitation limit by the dilution factor.
BQL = Below Quantitation Limit

FORM N.C. TCLP-8270R Rev. 081892

Industrial & Environmental Analysts, Inc. (IEA)
TCLP/ZHE REGULATED GC/MS PURGEABLES
SW-846 METHOD 8240

| | | | |
|---|---|---|---|
| IEA Project Number: | 979-028 | | |
| IEA Sample Number: | 9604259-01 | Date Received: | 04/10/96 |
| Client Name: | Federal Paperboard Co. | Date Sampled: | 04/08/96 |
| Client Project I.D.: | Waste Stream Characteristics | Date Analyzed: | 04/26/96 |
| Sample Identification: | 1 | Analysis By: | CREWES |
| Matrix: | WATER | Dilution Factor: | 1.0 |
| TCLP Extraction Date: | 04/19/96 | | |

| Number | Compound | N.C. Regulatory Level (mg/L) | Quantitation Limit (mg/L) | Results Concentration (mg/L) |
|---|---|---|---|---|
| 1 | Benzene | 0.05 | 0.010 | BQL |
| 2 | 2-Butanone | 20 | 0.020 | BQL |
| 3 | Carbon tetrachloride | 0.05 | 0.010 | BQL |
| 4 | Chlorobenzene | 10 | 0.010 | BQL |
| 5 | Chloroform | 0.60 | 0.010 | BQL |
| 6 | 1,2-Dichloroethane | 0.05 | 0.010 | BQL |
| 7 | 1,1-Dichloroethene | 0.07 | 0.010 | BQL |
| 8 | Tetrachloroethene | 0.07 | 0.010 | BQL |
| 9 | Trichloroethene | 0.05 | 0.010 | BQL |
| 10 | Vinyl chloride | 0.02 | 0.020 | BQL |

Comments:
Sample specific quantitation limits may be calculated by multiplying the quantitation limit by the dilution factor.
BQL = Below Quantitation Limit

FORM NC-T824R Rev. 041895

Industrial & Environmental Analysts, Inc. (IEA)
Level 2 Metals Results Report
TCLP METALS REGULATED

IEA Project #: 979_028
IEA Sample #: 960425901
Client Name: Federal Paperboard Co.
Client Proj. I.D.: Waste Stream Characteristics
Sample I.D.: 1

Matrix: LEACHATE
Date Received: 04/10/96
Date Sampled: 04/08/96
TCLP Extraction: 04/17/96

| Parameter | Method | N.C. Regulatory Level | Quant Limit | Result ( ug/l) | Date Prepared | Date Analyzed | Analyst | IEA Run | Prep Batch |
|---|---|---|---|---|---|---|---|---|---|
| ARSENIC | SW846 6010 | 500 | 50.0 | BQL | 04/19/96 | 04/19/96 | FXW | R4989 | 04199603P |
| BARIUM | SW846 6010 | 10000 | 1000 | 1620 | 04/19/96 | 04/19/96 | FXW | R4989 | 04199603P |
| CADMIUM | SW846 6010 | 100 | 10.0 | BQL | 04/19/96 | 04/19/96 | FXW | R4989 | 04199603P |
| CHROMIUM | SW846 6010 | 500 | 50.0 | BQL | 04/19/96 | 04/19/96 | FXW | R4989 | 04199603P |
| LEAD | SW846 6010 | 500 | 50.0 | BQL | 04/19/96 | 04/19/96 | FXW | R4989 | 04199603P |
| MERCURY | SW846 7470 | 20 | 2.00 | BQL | 04/19/96 | 04/20/96 | MLH | R4982 | 04199602H |
| SELENIUM | SW846 7740 | 100 | 10.0 | BQL | 04/19/96 | 04/24/96 | RRM | R5103 | 04199603F |
| SILVER | SW846 6010 | 500 | 50.0 | BQL | 04/19/96 | 04/19/96 | FXW | R4989 | 04199603P |

Comments:

Industrial & Environmental Analysts, Inc. (IEA)

IEA Project #: 979-028
IEA Sample #: 9604259-01 Matrix: Soil
Client Name: Federal Paperboard Co. Date Received: 04/10/96
Client Proj. I.D.: Waste Stream Characteristics Date Sampled: 04/08/96
Sample I.D.: 1

| Parameter | Method | Quantitation Limits | Results | Date Prepared | Date Analyzed | Analyst |
|---|---|---|---|---|---|---|
| Ignitability | 46 FR 25193 | N/A | Non-Flammable | N/A | 04/16/96 | NB |
| pH | SW-846 9045 | 0.1 | 12.4 | N/A | 04/16/96 | NB |
| R-Cyanide | SW-846 CHAP 8.3 | 0.25 mg/kg | BQL | 04/26/96 | 04/26/96 | SJ |
| R-pH | SW-846 CHAP 8.3 | 0.1 | 12.4 | N/A | 04/16/96 | NB |
| R-Sulfide | SW-846 CHAP 8.3 | 25 mg/kg | BQL | 04/26/96 | 04/26/96 | PW |

Comments:

FORM RESP3 Rev. 030994

Industrial & Environmental Analysts, Inc. (IEA)
TCLP REGULATED PESTICIDES / PCBs
SW-846 METHOD 8080

| | | | |
|---|---|---|---|
| IEA Project Number: | 979-028 | Date Received: | 04/10/96 |
| IEA Sample Number: | 9604259-01 | Date Sampled: | 04/08/96 |
| Client Name: | Federal Paperboard Co. | Date Extracted: | 04/23/96 |
| Client Project ID: | Waste Stream Characteristics | Date Analyzed: | 04/27/96 |
| Sample Identification: | 1 | Analysis By: | Eurillo |
| Matrix: | Leachate | Dilution Factor: | 1.0 |
| TCLP Extraction Date: | 04/17/96 | | |

| Number | Compound | N.C. Regulatory Level (mg/L) | Quantitation Limit (mg/L) | Results Concentration (mg/L) |
|---|---|---|---|---|
| 1 | gamma-BHC (Lindane) | 0.04 | 0.00025 | BQL |
| 2 | Heptachlor | 0.0008 | 0.00025 | BQL |
| 3 | Heptachlor epoxide | 0.0008 | 0.00025 | BQL |
| 4 | Endrin | 0.002 | 0.00050 | BQL |
| 5 | Methoxychlor | 1.00 | 0.0025 | BQL |
| 6 | Toxaphene | 0.05 | 0.0050 | BQL |
| 7 | Chlordane (technical) | 0.003 | 0.0025 | BQL |

Comments:
Sample specific quantitation limits may be calculated by multiplying the quantitation limit by the dilution factor.
BQL = Below Quantitation Limit

FORM N.C. T8080R Rev. 030293

Industrial & Environmental Analysts, Inc. (IEA)
TCLP HERBICIDES REGULATED
METHOD 8150

| | | | |
|---|---|---|---|
| IEA Project Number: | 979-028 | | |
| IEA Sample Number: | 9604259-01 | Date Received: | 04/10/96 |
| Client Name: | Federal Paperboard Co. | Date Sampled: | 04/08/96 |
| Client Project I.D.: | Waste Stream Characteristics | Date Extracted: | 04/22/96 |
| Sample Identification: | 1 | Date Analyzed: | 05/03/96 |
| Matrix: | Leachate | Analysis By: | Eurillo |
| TCLP Extraction Date: | 04/17/96 | Dilution Factor: | 1.0 |

| Number | Compound | N.C. Regulatory Level (mg/L) | Quantitation Limit (mg/L) | Results Concentration (mg/L) |
|---|---|---|---|---|
| 1 | 2,4-D | 1.00 | 0.010 | BQL |
| 2 | 2,4,5-TP | 0.10 | 0.0020 | BQL |

Comments:
Sample specific quantitation limits may be calculated by multiplying the quantitation limit by the dilution factor.
BQL = Below Quantitation Limit

FORM N.C. THERBR Rev. 030293

Industrial & Environmental Analysts, Inc. (IEA)
TCLP REGULATED
BASE/NEUTRAL/ACID EXTRACTABLES SW-846 METHOD 8270

| | | | |
|---|---|---|---|
| IEA Project Number: | 979-028 | | |
| IEA Sample Number: | 9604259-02 | Date Received: | 04/10/96 |
| Client Name: | Federal Paperboard Co. | Date Sampled: | 04/08/96 |
| Client Project I.D.: | Waste Stream Characteristics | Date Extracted: | 04/19/96 |
| Sample Identification: | 2 GRITS FPW | Date Analyzed: | 04/22/96 |
| Matrix: | Leachate | Analysis By: | Van Lare |
| TCLP Extraction Date: | 04/17/96 | Dilution Factor: | 1.0 |

| Number | Compound | N.C. Regulatory Level (mg/L) | Quantitation Limit (mg/L) | Results Concentration (mg/L) |
|---|---|---|---|---|
| 1 | 1,4-Dichlorobenzene | 0.75 | 0.010 | BQL |
| 2 | 2,4-Dinitrotoluene | 0.013 | 0.010 | BQL |
| 3 | Hexachlorobutadiene | 0.05 | 0.010 | BQL |
| 4 | Hexachloroethane | 0.30 | 0.010 | BQL |
| 5 | Total Cresol | 20 | 0.010 | BQL |
| 6 | Nitrobenzene | 0.20 | 0.010 | BQL |
| 7 | Pentachlorophenol | 10 | 0.050 | BQL |
| 8 | Pyridine | 0.50 | 0.010 | BQL |
| 9 | 2,4,5-Trichlorophenol | 40 | 0.010 | BQL |
| 10 | 2,4,6-Trichlorophenol | 0.20 | 0.010 | BQL |
| 11 | Hexachlorobenzene | 0.013 | 0.010 | BQL |

Comments:
Sample specific quantitation limits may be calculated by multiplying the quantitation limit by the dilution factor.
BQL = Below Quantitation Limit

FORM N.C. TCLP-8270R Rev. 081892

Industrial & Environmental Analysts, Inc. (IEA)
TCLP/ZHE REGULATED GC/MS PURGEABLES
SW-846 METHOD 8240

| | | | |
|---|---|---|---|
| IEA Project Number: | 979-028 | | |
| IEA Sample Number: | 9604259-02 | Date Received: | 04/10/96 |
| Client Name: | Federal Paperboard Co. | Date Sampled: | 04/08/96 |
| Client Project I.D.: | Waste Stream Characteristics | Date Analyzed: | 04/26/96 |
| Sample Identification: | 2 | Analysis By: | CREWES |
| Matrix: | WATER | Dilution Factor: | 1.0 |
| TCLP Extraction Date: | 04/19/96 | | |

| Number | Compound | N.C. Regulatory Level (mg/L) | Quantitation Limit (mg/L) | Results Concentration (mg/L) |
|---|---|---|---|---|
| 1 | Benzene | 0.05 | 0.010 | BQL |
| 2 | 2-Butanone | 20 | 0.020 | BQL |
| 3 | Carbon tetrachloride | 0.05 | 0.010 | BQL |
| 4 | Chlorobenzene | 10 | 0.010 | BQL |
| 5 | Chloroform | 0.60 | 0.010 | BQL |
| 6 | 1,2-Dichloroethane | 0.05 | 0.010 | BQL |
| 7 | 1,1-Dichloroethene | 0.07 | 0.010 | BQL |
| 8 | Tetrachloroethene | 0.07 | 0.010 | BQL |
| 9 | Trichloroethene | 0.05 | 0.010 | BQL |
| 10 | Vinyl chloride | 0.02 | 0.020 | BQL |

Comments:
Sample specific quantitation limits may be calculated by multiplying the quantitation limit by the dilution factor.
BQL = Below Quantitation Limit

Industrial & Environmental Analysts, Inc. (IEA)
Level 2 Metals Results Report
TCLP METALS REGULATED

IEA Project #: 979_028
IEA Sample #: 960425902
Client Name: Federal Paperboard Co.
Client Proj. I.D.: Waste Stream Characteristics
Sample I.D.: 2

Matrix: LEACHATE
Date Received: 04/10/96
Date Sampled: 04/08/96
TCLP Extraction: 04/17/96

| Parameter | Method | N.C. Regulatory Level | Quant Limit | Result ( ug/l) | Date Prepared | Date Analyzed | Analyst | IEA Run | Prep Batch |
|---|---|---|---|---|---|---|---|---|---|
| ARSENIC | SW846 6010 | 500 | 50.0 | BQL | 04/19/96 | 04/19/96 | FXW | R4989 | 04199603P |
| BARIUM | SW846 6010 | 10000 | 1000 | 1550 | 04/19/96 | 04/19/96 | FXW | R4989 | 04199603P |
| CADMIUM | SW846 6010 | 100 | 10.0 | BQL | 04/19/96 | 04/19/96 | FXW | R4989 | 04199603P |
| CHROMIUM | SW846 6010 | 500 | 50.0 | BQL | 04/19/96 | 04/19/96 | FXW | R4989 | 04199603P |
| LEAD | SW846 6010 | 500 | 50.0 | BQL | 04/19/96 | 04/19/96 | FXW | R4989 | 04199603P |
| MERCURY | SW846 7470 | 20 | 2.00 | BQL | 04/19/96 | 04/20/96 | MLH | R4982 | 04199602H |
| SELENIUM | SW846 7740 | 100 | 10.0 | BQL | 04/19/96 | 04/24/96 | RRM | R5103 | 04199603F |
| SILVER | SW846 6010 | 500 | 50.0 | BQL | 04/19/96 | 04/19/96 | FXW | R4989 | 04199603P |

Comments:

Industrial & Environmental Analysts, Inc. (IEA)

IEA Project #: 979-028
IEA Sample #: 9604259-02 Matrix: Soil
Client Name: Federal Paperboard Co. Date Received: 04/10/96
Client Proj. I.D.: Waste Stream Characteristics Date Sampled: 04/08/96
Sample I.D.: 2

| Parameter | Method | Quantitation Limits | Results | Date Prepared | Date Analyzed | Analyst |
|---|---|---|---|---|---|---|
| Ignitability | 46 FR 25193 | N/A | Non-Flammable | N/A | 04/16/96 | NB |
| pH | SW-846 9045 | 0.1 | 10.8 | N/A | 04/16/96 | NB |
| R-Cyanide | SW-846 CHAP 8.3 | 0.25 mg/kg | BQL | 04/26/96 | 04/26/96 | SJ |
| R-pH | SW-846 CHAP 8.3 | 0.1 | 10.8 | N/A | 04/16/96 | NB |
| R-Sulfide | SW-846 CHAP 8.3 | 25 mg/kg | BQL | 04/26/96 | 04/26/96 | PW |

Comments:

FORM RESP3 Rev. 030994

Industrial & Environmental Analysts, Inc. (IEA)
TCLP REGULATED PESTICIDES / PCBs
SW-846 METHOD 8080

| | | | |
|---|---|---|---|
| IEA Project Number: | 979-028 | Date Received: | 04/10/96 |
| IEA Sample Number: | 9604259-02 | Date Sampled: | 04/08/96 |
| Client Name: | Federal Paperboard Co. | Date Extracted: | 04/23/96 |
| Client Project ID: | Waste Stream Characteristics | Date Analyzed: | 04/27/96 |
| Sample Identification: | 2 | Analysis By: | Eurillo |
| Matrix: | Leachate | Dilution Factor: | 1.0 |
| TCLP Extraction Date: | 04/17/96 | | |

| Number | Compound | N.C. Regulatory Level (mg/L) | Quantitation Limit (mg/L) | Results Concentration (mg/L) |
|---|---|---|---|---|
| 1 | gamma-BHC (Lindane) | 0.04 | 0.00025 | BQL |
| 2 | Heptachlor | 0.0008 | 0.00025 | BQL |
| 3 | Heptachlor epoxide | 0.0008 | 0.00025 | BQL |
| 4 | Endrin | 0.002 | 0.00050 | BQL |
| 5 | Methoxychlor | 1.00 | 0.0025 | BQL |
| 6 | Toxaphene | 0.05 | 0.0050 | BQL |
| 7 | Chlordane (technical) | 0.003 | 0.0025 | BQL |

Comments:
Sample specific quantitation limits may be calculated by multiplying the quantitation limit by the dilution factor.
BQL = Below Quantitation Limit

FORM N.C. T8080R Rev. 030293

Industrial & Environmental Analysts, Inc. (IEA)
TCLP HERBICIDES REGULATED
METHOD 8150

| | | | |
|---|---|---|---|
| IEA Project Number: | 979-028 | | |
| IEA Sample Number: | 9604259-02 | Date Received: | 04/10/96 |
| Client Name: | Federal Paperboard Co. | Date Sampled: | 04/08/96 |
| Client Project I.D.: | Waste Stream Characteristics | Date Extracted: | 04/22/96 |
| Sample Identification: | 2 | Date Analyzed: | 05/03/96 |
| Matrix: | Leachate | Analysis By: | Eurillo |
| TCLP Extraction Date: | 04/17/96 | Dilution Factor: | 1.0 |

| Number | Compound | N.C. Regulatory Level (mg/L) | Quantitation Limit (mg/L) | Results Concentration (mg/L) |
|---|---|---|---|---|
| 1 | 2,4-D | 1.00 | 0.010 | BQL |
| 2 | 2,4,5-TP | 0.10 | 0.0020 | BQL |

Comments:
Sample specific quantitation limits may be calculated by multiplying the quantitation limit by the dilution factor.
BQL = Below Quantitation Limit

FORM N.C. THERBR Rev. 030293

Industrial & Environmental Analysts, Inc. (IEA)
TCLP REGULATED
BASE/NEUTRAL/ACID EXTRACTABLES SW-846 METHOD 8270

| | | | |
|---|---|---|---|
| IEA Project Number: | 979-028 | | |
| IEA Sample Number: | 9604259-03 | Date Received: | 04/10/96 |
| Client Name: | Federal Paperboard Co. | Date Sampled: | 04/08/96 |
| Client Project I.D.: | Waste Stream Characteristics | Date Extracted: | 04/22/96 |
| Sample Identification: | 3 SLUDGE TO CLARIFIER FPW | Date Analyzed: | 04/23/96 |
| Matrix: | Leachate | Analysis By: | Van Lare |
| TCLP Extraction Date: | 04/17/96 | Dilution Factor: | 1.0 |

| Number | Compound | N.C. Regulatory Level (mg/L) | Quantitation Limit (mg/L) | Results Concentration (mg/L) |
|---|---|---|---|---|
| 1 | 1,4-Dichlorobenzene | 0.75 | 0.010 | BQL |
| 2 | 2,4-Dinitrotoluene | 0.013 | 0.010 | BQL |
| 3 | Hexachlorobutadiene | 0.05 | 0.010 | BQL |
| 4 | Hexachloroethane | 0.30 | 0.010 | BQL |
| 5 | Total Cresol | 20 | 0.010 | BQL |
| 6 | Nitrobenzene | 0.20 | 0.010 | BQL |
| 7 | Pentachlorophenol | 10 | 0.050 | BQL |
| 8 | Pyridine | 0.50 | 0.010 | BQL |
| 9 | 2,4,5-Trichlorophenol | 40 | 0.010 | BQL |
| 10 | 2,4,6-Trichlorophenol | 0.20 | 0.010 | BQL |
| 11 | Hexachlorobenzene | 0.013 | 0.010 | BQL |

Comments:
Sample specific quantitation limits may be calculated by multiplying the quantitation limit by the dilution factor.
BQL = Below Quantitation Limit

FORM N.C. TCLP-8270R Rev. 081892

Industrial & Environmental Analysts, Inc. (IEA)
TCLP/ZHE REGULATED GC/MS PURGEABLES
SW-846 METHOD 8240

| | | | |
|---|---|---|---|
| IEA Project Number: | 979-028 | | |
| IEA Sample Number: | 9604259-03 | Date Received: | 04/10/96 |
| Client Name: | Federal Paperboard Co. | Date Sampled: | 04/08/96 |
| Client Project I.D.: | Waste Stream Characteristics | Date Analyzed: | 04/26/96 |
| Sample Identification: | 3 | Analysis By: | CREWES |
| Matrix: | WATER | Dilution Factor: | 2.5 |
| TCLP Extraction Date: | 04/19/96 | | |

| Number | Compound | N.C. Regulatory Level (mg/L) | Quantitation Limit (mg/L) | Results Concentration (mg/L) |
|---|---|---|---|---|
| 1 | Benzene | 0.05 | 0.010 | BQL |
| 2 | 2-Butanone | 20 | 0.020 | BQL |
| 3 | Carbon tetrachloride | 0.05 | 0.010 | BQL |
| 4 | Chlorobenzene | 10 | 0.010 | BQL |
| 5 | Chloroform | 0.60 | 0.010 | BQL |
| 6 | 1,2-Dichloroethane | 0.05 | 0.010 | BQL |
| 7 | 1,1-Dichloroethene | 0.07 | 0.010 | BQL |
| 8 | Tetrachloroethene | 0.07 | 0.010 | BQL |
| 9 | Trichloroethene | 0.05 | 0.010 | BQL |
| 10 | Vinyl chloride | 0.02 | 0.020 | BQL |

Comments:
Sample specific quantitation limits may be calculated by multiplying the quantitation limit by the dilution factor.
BQL = Below Quantitation Limit
Quantitation limit elevated due to sample dilution prior to analysis.
Sample diluted to prevent excessive foam while purging.

Industrial & Environmental Analysts, Inc. (IEA)
Level 2 Metals Results Report
TCLP METALS REGULATED

IEA Project #: 979_028
IEA Sample #: 960425903
Client Name: Federal Paperboard Co.
Client Proj. I.D.: Waste Stream Characteristics
Sample I.D.: 3

Matrix: LEACHATE
Date Received: 04/10/96
Date Sampled: 04/08/96
TCLP Extraction: 04/19/96

| Parameter | Method | N.C. Regulatory Level | Quant Limit | Result ( ug/l) | Date Prepared | Date Analyzed | Analyst | IEA Run | Prep Batch |
|---|---|---|---|---|---|---|---|---|---|
| ARSENIC | SW846 6010 | 500 | 50.0 | 391. | 04/24/96 | 04/29/96 | RRM | R5099 | 04249608P |
| BARIUM | SW846 6010 | 10000 | 1000 | 7720 | 04/24/96 | 04/29/96 | RRM | R5099 | 04249608P |
| CADMIUM | SW846 6010 | 100 | 10.0 | 80.2 | 04/24/96 | 04/29/96 | RRM | R5099 | 04249608P |
| CHROMIUM | SW846 6010 | 500 | 50.0 | 401. | 04/24/96 | 04/29/96 | RRM | R5099 | 04249608P |
| LEAD | SW846 6010 | 500 | 50.0 | 355. | 04/24/96 | 04/29/96 | RRM | R5099 | 04249608P |
| MERCURY | SW846 7470 | 20 | 2.00 | BQL | 04/22/96 | 04/20/96 | LXG | R4984 | 04229601H |
| SELENIUM | SW846 7740 | 100 | 10.0 | BQL | 04/24/96 | 04/26/96 | RRM | R5082 | 04249609F |
| SILVER | SW846 6010 | 500 | 50.0 | 357. | 04/24/96 | 04/29/96 | RRM | R5099 | 04249608P |

Comments:

Industrial & Environmental Analysts, Inc. (IEA)

IEA Project #: 979-028
IEA Sample #: 9604259-03 Matrix: Water
Client Name: Federal Paperboard Co. Date Received: 04/10/96
Client Proj. I.D.: Waste Stream Characteristics Date Sampled: 04/08/96
Sample I.D.: 3

| Parameter | Method | Quantitation Limits | Results | Date Prepared | Date Analyzed | Analyst |
|---|---|---|---|---|---|---|
| Ignitability | SW-846 1010 | 70 Deg F | >200 Deg F | N/A | 04/17/96 | NB |
| pH | EPA 150.1 | 0.1 | 10.1 | N/A | 04/16/96 | NB |
| R-Cyanide | SW-846 CHAP 8.3 | 0.25 mg/kg | BQL | 04/26/96 | 04/26/96 | SJ |
| R-pH | SW-846 CHAP 8.3 | 0.1 | 10.1 | N/A | 04/16/96 | NB |
| R-Sulfide | SW-846 CHAP 8.3 | 25 mg/kg | BQL | 04/26/96 | 04/26/96 | PW |

Comments:

FORM RESP3 Rev. 030994

Industrial & Environmental Analysts, Inc. (IEA)
TCLP REGULATED PESTICIDES / PCBs
SW-846 METHOD 8080

| | | | |
|---|---|---|---|
| IEA Project Number: | 979-028 | Date Received: | 04/10/96 |
| IEA Sample Number: | 9604259-03 | Date Sampled: | 04/08/96 |
| Client Name: | Federal Paperboard Co. | Date Extracted: | 04/23/96 |
| Client Project ID: | Waste Stream Characteristics | Date Analyzed: | 04/27/96 |
| Sample Identification: | 3 | Analysis By: | Eurillo |
| Matrix: | Leachate | Dilution Factor: | 1.0 |
| TCLP Extraction Date: | 04/19/96 | | |

| Number | Compound | N.C. Regulatory Level (mg/L) | Quantitation Limit (mg/L) | Results Concentration (mg/L) |
|---|---|---|---|---|
| 1 | gamma-BHC (Lindane) | 0.04 | 0.00025 | BQL |
| 2 | Heptachlor | 0.0008 | 0.00025 | BQL |
| 3 | Heptachlor epoxide | 0.0008 | 0.00025 | BQL |
| 4 | Endrin | 0.002 | 0.00050 | BQL |
| 5 | Methoxychlor | 1.00 | 0.0025 | BQL |
| 6 | Toxaphene | 0.05 | 0.0050 | BQL |
| 7 | Chlordane (technical) | 0.003 | 0.0025 | BQL |

Comments:
Sample specific quantitation limits may be calculated by multiplying the quantitation limit by the dilution factor.
BQL = Below Quantitation Limit

FORM N.C. T8080R Rev. 030293

Industrial & Environmental Analysts, Inc. (IEA)
TCLP HERBICIDES REGULATED
METHOD 8150

| | | | |
|---|---|---|---|
| IEA Project Number: | 979-028 | | |
| IEA Sample Number: | 9604259-03 | Date Received: | 04/10/96 |
| Client Name: | Federal Paperboard Co. | Date Sampled: | 04/08/96 |
| Client Project I.D.: | Waste Stream Characteristics | Date Extracted: | 04/22/96 |
| Sample Identification: | 3 | Date Analyzed: | 05/03/96 |
| Matrix: | Leachate | Analysis By: | Eurillo |
| TCLP Extraction Date: | 04/19/96 | Dilution Factor: | 1.0 |

| Number | Compound | N.C. Regulatory Level (mg/L) | Quantitation Limit (mg/L) | Results Concentration (mg/L) |
|---|---|---|---|---|
| 1 | 2,4-D | 1.00 | 0.010 | BQL |
| 2 | 2,4,5-TP | 0.10 | 0.0020 | BQL |

Comments:
Sample specific quantitation limits may be calculated by multiplying the quantitation limit by the dilution factor.
BQL = Below Quantitation Limit

FORM N.C. THERBR Rev. 030293

Industrial & Environmental Analysts, Inc. (IEA)
TCLP REGULATED
BASE/NEUTRAL/ACID EXTRACTABLES SW-846 METHOD 8270

| | | | |
|---|---|---|---|
| IEA Project Number: | 979-028 | | |
| IEA Sample Number: | 9604259-04 | Date Received: | 04/10/96 |
| Client Name: | Federal Paperboard Co. | Date Sampled: | 04/08/96 |
| Client Project I.D.: | Waste Stream Characteristics | Date Extracted: | 04/19/96 |
| Sample Identification: | 4 OLD LIME MUD POND FPW | Date Analyzed: | 04/22/96 |
| Matrix: | Leachate | Analysis By: | Van Lare |
| TCLP Extraction Date: | 04/17/96 | Dilution Factor: | 1.0 |

| Number | Compound | N.C. Regulatory Level (mg/L) | Quantitation Limit (mg/L) | Results Concentration (mg/L) |
|---|---|---|---|---|
| 1 | 1,4-Dichlorobenzene | 0.75 | 0.010 | BQL |
| 2 | 2,4-Dinitrotoluene | 0.013 | 0.010 | BQL |
| 3 | Hexachlorobutadiene | 0.05 | 0.010 | BQL |
| 4 | Hexachloroethane | 0.30 | 0.010 | BQL |
| 5 | Total Cresol | 20 | 0.010 | BQL |
| 6 | Nitrobenzene | 0.20 | 0.010 | BQL |
| 7 | Pentachlorophenol | 10 | 0.050 | BQL |
| 8 | Pyridine | 0.50 | 0.010 | BQL |
| 9 | 2,4,5-Trichlorophenol | 40 | 0.010 | BQL |
| 10 | 2,4,6-Trichlorophenol | 0.20 | 0.010 | BQL |
| 11 | Hexachlorobenzene | 0.013 | 0.010 | BQL |

Comments:
Sample specific quantitation limits may be calculated by multiplying the quantitation limit by the dilution factor.
BQL = Below Quantitation Limit

FORM N.C. TCLP-8270R Rev. 081892

Industrial & Environmental Analysts, Inc. (IEA)
TCLP/ZHE REGULATED GC/MS PURGEABLES
SW-846 METHOD 8240

| | | | |
|---|---|---|---|
| IEA Project Number: | 979-028 | | |
| IEA Sample Number: | 9604259-04 | Date Received: | 04/10/96 |
| Client Name: | Federal Paperboard Co. | Date Sampled: | 04/08/96 |
| Client Project I.D.: | Waste Stream Characteristics | Date Analyzed: | 04/26/96 |
| Sample Identification: | 4 | Analysis By: | CREWES |
| Matrix: | WATER | Dilution Factor: | 1.0 |
| TCLP Extraction Date: | 04/19/96 | | |

| Number | Compound | N.C. Regulatory Level (mg/L) | Quantitation Limit (mg/L) | Results Concentration (mg/L) |
|---|---|---|---|---|
| 1 | Benzene | 0.05 | 0.010 | BQL |
| 2 | 2-Butanone | 20 | 0.020 | BQL |
| 3 | Carbon tetrachloride | 0.05 | 0.010 | BQL |
| 4 | Chlorobenzene | 10 | 0.010 | BQL |
| 5 | Chloroform | 0.60 | 0.010 | BQL |
| 6 | 1,2-Dichloroethane | 0.05 | 0.010 | BQL |
| 7 | 1,1-Dichloroethene | 0.07 | 0.010 | BQL |
| 8 | Tetrachloroethene | 0.07 | 0.010 | BQL |
| 9 | Trichloroethene | 0.05 | 0.010 | BQL |
| 10 | Vinyl chloride | 0.02 | 0.020 | BQL |

Comments:
Sample specific quantitation limits may be calculated by multiplying the quantitation limit by the dilution factor.
BQL = Below Quantitation Limit

FORM NC-T824R Rev. 041895

Industrial & Environmental Analysts, Inc. (IEA)
Level 2 Metals Results Report
TCLP METALS REGULATED

IEA Project #: 979_028
IEA Sample #: 960425904
Client Name: Federal Paperboard Co.
Client Proj. I.D.: Waste Stream Characteristics
Sample I.D.: 4

Matrix: LEACHATE
Date Received: 04/10/96
Date Sampled: 04/08/96
TCLP Extraction: 04/17/96

| Parameter | Method | N.C. Regulatory Level | Quant Limit | Result ( ug/l) | Date Prepared | Date Analyzed | Analyst | IEA Run | Prep Batch |
|---|---|---|---|---|---|---|---|---|---|
| ARSENIC | SW846 6010 | 500 | 50.0 | BQL | 04/19/96 | 04/19/96 | FXW | R4989 | 04199603P |
| BARIUM | SW846 6010 | 10000 | 1000 | BQL | 04/19/96 | 04/19/96 | FXW | R4989 | 04199603P |
| CADMIUM | SW846 6010 | 100 | 10.0 | BQL | 04/19/96 | 04/19/96 | FXW | R4989 | 04199603P |
| CHROMIUM | SW846 6010 | 500 | 50.0 | BQL | 04/19/96 | 04/19/96 | FXW | R4989 | 04199603P |
| LEAD | SW846 6010 | 500 | 50.0 | BQL | 04/19/96 | 04/19/96 | FXW | R4989 | 04199603P |
| MERCURY | SW846 7470 | 20 | 2.00 | BQL | 04/19/96 | 04/20/96 | MLH | R4982 | 04199602H |
| SELENIUM | SW846 7740 | 100 | 10.0 | BQL | 04/19/96 | 04/24/96 | RRM | R5103 | 04199603F |
| SILVER | SW846 6010 | 500 | 50.0 | BQL | 04/19/96 | 04/19/96 | FXW | R4989 | 04199603P |

Comments:

Industrial & Environmental Analysts, Inc. (IEA)

IEA Project #: 979-028
IEA Sample #: 9604259-04 Matrix: Soil
Client Name: Federal Paperboard Co. Date Received: 04/10/96
Client Proj. I.D.: Waste Stream Characteristics Date Sampled: 04/08/96
Sample I.D.: 4

| Parameter | Method | Quantitation Limits | Results | Date Prepared | Date Analyzed | Analyst |
|---|---|---|---|---|---|---|
| Ignitability | 46 FR 25193 | N/A | Non-Flammable | N/A | 04/16/96 | NB |
| pH | SW-846 9045 | 0.1 | 11.9 | N/A | 04/16/96 | NB |
| R-Cyanide | SW-846 CHAP 8.3 | 0.25 mg/kg | BQL | 04/26/96 | 04/26/96 | SJ |
| R-pH | SW-846 CHAP 8.3 | 0.1 | 11.9 | N/A | 04/16/96 | NB |
| R-Sulfide | SW-846 CHAP 8.3 | 25 mg/kg | BQL | 04/26/96 | 04/26/96 | PW |

Comments:

FORM RESP3 Rev. 030994

Industrial & Environmental Analysts, Inc. (IEA)
TCLP REGULATED PESTICIDES / PCBs
SW-846 METHOD 8080

| | | | |
|---|---|---|---|
| IEA Project Number: | 979-028 | Date Received: | 04/10/96 |
| IEA Sample Number: | 9604259-04 | Date Sampled: | 04/08/96 |
| Client Name: | Federal Paperboard Co. | Date Extracted: | 04/23/96 |
| Client Project ID: | Waste Stream Characteristics | Date Analyzed: | 04/27/96 |
| Sample Identification: | 4 | Analysis By: | Eurillo |
| Matrix: | Leachate | Dilution Factor: | 1.0 |
| TCLP Extraction Date: | 04/17/96 | | |

| Number | Compound | N.C. Regulatory Level (mg/L) | Quantitation Limit (mg/L) | Results Concentration (mg/L) |
|---|---|---|---|---|
| 1 | gamma-BHC (Lindane) | 0.04 | 0.00025 | BQL |
| 2 | Heptachlor | 0.0008 | 0.00025 | BQL |
| 3 | Heptachlor epoxide | 0.0008 | 0.00025 | BQL |
| 4 | Endrin | 0.002 | 0.00050 | BQL |
| 5 | Methoxychlor | 1.00 | 0.0025 | BQL |
| 6 | Toxaphene | 0.05 | 0.0050 | BQL |
| 7 | Chlordane (technical) | 0.003 | 0.0025 | BQL |

Comments:
Sample specific quantitation limits may be calculated by multiplying the quantitation limit by the dilution factor.
BQL = Below Quantitation Limit

FORM N.C. T8080R Rev. 030293

Industrial & Environmental Analysts, Inc. (IEA)
TCLP HERBICIDES REGULATED
METHOD 8150

| | | | |
|---|---|---|---|
| IEA Project Number: | 979-028 | | |
| IEA Sample Number: | 9604259-04 | Date Received: | 04/10/96 |
| Client Name: | Federal Paperboard Co. | Date Sampled: | 04/08/96 |
| Client Project I.D.: | Waste Stream Characteristics | Date Extracted: | 04/22/96 |
| Sample Identification: | 4 | Date Analyzed: | 05/03/96 |
| Matrix: | Leachate | Analysis By: | Eurillo |
| TCLP Extraction Date: | 04/17/96 | Dilution Factor: | 1.0 |

| Number | Compound | N.C. Regulatory Level (mg/L) | Quantitation Limit (mg/L) | Results Concentration (mg/L) |
|---|---|---|---|---|
| 1 | 2,4-D | 1.00 | 0.010 | BQL |
| 2 | 2,4,5-TP | 0.10 | 0.0020 | BQL |

Comments:
Sample specific quantitation limits may be calculated by multiplying the quantitation limit by the dilution factor.
BQL = Below Quantitation Limit

FORM N.C. THERBR Rev. 030293

Industrial & Environmental Analysts, Inc. (IEA)
TCLP REGULATED
BASE/NEUTRAL/ACID EXTRACTABLES SW-846 METHOD 8270

| | | | |
|---|---|---|---|
| IEA Project Number: | 979-028 | | |
| IEA Sample Number: | 9604259-05 | Date Received: | 04/10/96 |
| Client Name: | Federal Paperboard Co. | Date Sampled: | 04/08/96 |
| Client Project I.D.: | Waste Stream Characteristics | Date Extracted: | 04/19/96 |
| Sample Identification: | 5 NEW LIME MUD POND FPW | Date Analyzed: | 04/22/96 |
| Matrix: | Leachate | Analysis By: | Van Lare |
| TCLP Extraction Date: | 04/17/96 | Dilution Factor: | 1.0 |

| Number | Compound | N.C. Regulatory Level (mg/L) | Quantitation Limit (mg/L) | Results Concentration (mg/L) |
|---|---|---|---|---|
| 1 | 1,4-Dichlorobenzene | 0.75 | 0.010 | BQL |
| 2 | 2,4-Dinitrotoluene | 0.013 | 0.010 | BQL |
| 3 | Hexachlorobutadiene | 0.05 | 0.010 | BQL |
| 4 | Hexachloroethane | 0.30 | 0.010 | BQL |
| 5 | Total Cresol | 20 | 0.010 | BQL |
| 6 | Nitrobenzene | 0.20 | 0.010 | BQL |
| 7 | Pentachlorophenol | 10 | 0.050 | BQL |
| 8 | Pyridine | 0.50 | 0.010 | BQL |
| 9 | 2,4,5-Trichlorophenol | 40 | 0.010 | BQL |
| 10 | 2,4,6-Trichlorophenol | 0.20 | 0.010 | BQL |
| 11 | Hexachlorobenzene | 0.013 | 0.010 | BQL |

Comments:
Sample specific quantitation limits may be calculated by multiplying the quantitation limit by the dilution factor.
BQL = Below Quantitation Limit

FORM N.C. TCLP-8270R Rev. 081892

Industrial & Environmental Analysts, Inc. (IEA)
TCLP/ZHE REGULATED GC/MS PURGEABLES
SW-846 METHOD 8240

| | | | |
|---|---|---|---|
| IEA Project Number: | 979-028 | | |
| IEA Sample Number: | 9604259-05 | Date Received: | 04/10/96 |
| Client Name: | Federal Paperboard Co. | Date Sampled: | 04/08/96 |
| Client Project I.D.: | Waste Stream Characteristics | Date Analyzed: | 04/26/96 |
| Sample Identification: | 5 | Analysis By: | CREWES |
| Matrix: | WATER | Dilution Factor: | 1.0 |
| TCLP Extraction Date: | 04/19/96 | | |

| Number | Compound | N.C. Regulatory Level (mg/L) | Quantitation Limit (mg/L) | Results Concentration (mg/L) |
|---|---|---|---|---|
| 1 | Benzene | 0.05 | 0.010 | BQL |
| 2 | 2-Butanone | 20 | 0.020 | BQL |
| 3 | Carbon tetrachloride | 0.05 | 0.010 | BQL |
| 4 | Chlorobenzene | 10 | 0.010 | BQL |
| 5 | Chloroform | 0.60 | 0.010 | BQL |
| 6 | 1,2-Dichloroethane | 0.05 | 0.010 | BQL |
| 7 | 1,1-Dichloroethene | 0.07 | 0.010 | BQL |
| 8 | Tetrachloroethene | 0.07 | 0.010 | BQL |
| 9 | Trichloroethene | 0.05 | 0.010 | BQL |
| 10 | Vinyl chloride | 0.02 | 0.020 | BQL |

Comments:
Sample specific quantitation limits may be calculated by multiplying the quantitation limit by the dilution factor.
BQL = Below Quantitation Limit

FORM NC-T824R Rev. 041895

Industrial & Environmental Analysts, Inc. (IEA)
Level 2 Metals Results Report
TCLP METALS REGULATED

IEA Project #: 979_028
IEA Sample #: 960425905
Client Name: Federal Paperboard Co.
Client Proj. I.D.: Waste Stream Characteristics
Sample I.D.: 5

Matrix: LEACHATE
Date Received: 04/10/96
Date Sampled: 04/08/96
TCLP Extraction: 04/17/96

| Parameter | Method | N.C. Regulatory Level | Quant Limit | Result ( ug/l) | Date Prepared | Date Analyzed | Analyst | IEA Run | Prep Batch |
|---|---|---|---|---|---|---|---|---|---|
| ARSENIC | SW846 6010 | 500 | 50.0 | BQL | 04/19/96 | 04/19/96 | FXW | R4989 | 04199603P |
| BARIUM | SW846 6010 | 10000 | 1000 | BQL | 04/19/96 | 04/19/96 | FXW | R4989 | 04199603P |
| CADMIUM | SW846 6010 | 100 | 10.0 | BQL | 04/19/96 | 04/19/96 | FXW | R4989 | 04199603P |
| CHROMIUM | SW846 6010 | 500 | 50.0 | BQL | 04/19/96 | 04/19/96 | FXW | R4989 | 04199603P |
| LEAD | SW846 6010 | 500 | 50.0 | BQL | 04/19/96 | 04/19/96 | FXW | R4989 | 04199603P |
| MERCURY | SW846 7470 | 20 | 2.00 | BQL | 04/19/96 | 04/20/96 | MLH | R4982 | 04199602H |
| SELENIUM | SW846 7740 | 100 | 10.0 | BQL | 04/19/96 | 04/22/96 | RRM | R5028 | 04199603F |
| SILVER | SW846 6010 | 500 | 50.0 | BQL | 04/19/96 | 04/19/96 | FXW | R4989 | 04199603P |

Comments:

Industrial & Environmental Analysts, Inc. (IEA)

IEA Project #: 979-028
IEA Sample #: 9604259-05 Matrix: Soil
Client Name: Federal Paperboard Co. Date Received: 04/10/96
Client Proj. I.D.: Waste Stream Characteristics Date Sampled: 04/08/96
Sample I.D.: 5

| Parameter | Method | Quantitation Limits | Results | Date Prepared | Date Analyzed | Analyst |
|---|---|---|---|---|---|---|
| Ignitability | 46 FR 25193 | N/A | Non-Flammable | N/A | 04/16/96 | NB |
| pH | SW-846 9045 | 0.1 | 9.5 | N/A | 04/16/96 | NB |
| R-Cyanide | SW-846 CHAP 8.3 | 0.25 mg/kg | BQL | 04/26/96 | 04/26/96 | SJ |
| R-pH | SW-846 CHAP 8.3 | 0.1 | 9.5 | N/A | 04/16/96 | NB |
| R-Sulfide | SW-846 CHAP 8.3 | 25 mg/kg | BQL | 04/26/96 | 04/26/96 | PW |

Comments:

FORM RESP3 Rev. 030994

Industrial & Environmental Analysts, Inc. (IEA)
TCLP REGULATED PESTICIDES / PCBs
SW-846 METHOD 8080

| | | | |
|---|---|---|---|
| IEA Project Number: | 979-028 | Date Received: | 04/10/96 |
| IEA Sample Number: | 9604259-05 | Date Sampled: | 04/08/96 |
| Client Name: | Federal Paperboard Co. | Date Extracted: | 04/23/96 |
| Client Project ID: | Waste Stream Characteristics | Date Analyzed: | 04/27/96 |
| Sample Identification: | 5 | Analysis By: | Eurillo |
| Matrix: | Leachate | Dilution Factor: | 1.0 |
| TCLP Extraction Date: | 04/17/96 | | |

| Number | Compound | N.C. Regulatory Level (mg/L) | Quantitation Limit (mg/L) | Results Concentration (mg/L) |
|---|---|---|---|---|
| 1 | gamma-BHC (Lindane) | 0.04 | 0.00025 | BQL |
| 2 | Heptachlor | 0.0008 | 0.00025 | BQL |
| 3 | Heptachlor epoxide | 0.0008 | 0.00025 | BQL |
| 4 | Endrin | 0.002 | 0.00050 | BQL |
| 5 | Methoxychlor | 1.00 | 0.0025 | BQL |
| 6 | Toxaphene | 0.05 | 0.0050 | BQL |
| 7 | Chlordane (technical) | 0.003 | 0.0025 | BQL |

Comments:
Sample specific quantitation limits may be calculated by multiplying the quantitation limit by the dilution factor.
BQL = Below Quantitation Limit

FORM N.C. T8080R Rev. 030293

Industrial & Environmental Analysts, Inc. (IEA)
TCLP HERBICIDES REGULATED
METHOD 8150

| | | | |
|---|---|---|---|
| IEA Project Number: | 979-028 | | |
| IEA Sample Number: | 9604259-05 | Date Received: | 04/10/96 |
| Client Name: | Federal Paperboard Co. | Date Sampled: | 04/08/96 |
| Client Project I.D.: | Waste Stream Characteristics | Date Extracted: | 04/22/96 |
| Sample Identification: | 5 | Date Analyzed: | 05/03/96 |
| Matrix: | Leachate | Analysis By: | Eurillo |
| TCLP Extraction Date: | 04/17/96 | Dilution Factor: | 1.0 |

| Number | Compound | N.C. Regulatory Level (mg/L) | Quantitation Limit (mg/L) | Results Concentration (mg/L) |
|---|---|---|---|---|
| 1 | 2,4-D | 1.00 | 0.010 | BQL |
| 2 | 2,4,5-TP | 0.10 | 0.0020 | BQL |

Comments:
Sample specific quantitation limits may be calculated by multiplying the quantitation limit by the dilution factor.
BQL = Below Quantitation Limit

FORM N.C. THERBR Rev. 030293

Industrial & Environmental Analysts, Inc. (IEA)
TCLP REGULATED
BASE/NEUTRAL/ACID EXTRACTABLES SW-846 METHOD 8270

| | | | |
|---|---|---|---|
| IEA Project Number: | 979-028 | | |
| IEA Sample Number: | 9604259-06 | Date Received: | 04/10/96 |
| Client Name: | Federal Paperboard Co. | Date Sampled: | 04/08/96 |
| Client Project I.D.: | Waste Stream Characteristics | Date Extracted: | 04/19/96 |
| Sample Identification: | 6 Power Boiler Ash FPW | Date Analyzed: | 04/22/96 |
| Matrix: | Leachate | Analysis By: | Van Lare |
| TCLP Extraction Date: | 04/17/96 | Dilution Factor: | 1.0 |

| Number | Compound | N.C. Regulatory Level (mg/L) | Quantitation Limit (mg/L) | Results Concentratio (mg/L) |
|---|---|---|---|---|
| 1 | 1,4-Dichlorobenzene | 0.75 | 0.010 | BQL |
| 2 | 2,4-Dinitrotoluene | 0.013 | 0.010 | BQL |
| 3 | Hexachlorobutadiene | 0.05 | 0.010 | BQL |
| 4 | Hexachloroethane | 0.30 | 0.010 | BQL |
| 5 | Total Cresol | 20 | 0.010 | BQL |
| 6 | Nitrobenzene | 0.20 | 0.010 | BQL |
| 7 | Pentachlorophenol | 10 | 0.050 | BQL |
| 8 | Pyridine | 0.50 | 0.010 | BQL |
| 9 | 2,4,5-Trichlorophenol | 40 | 0.010 | BQL |
| 10 | 2,4,6-Trichlorophenol | 0.20 | 0.010 | BQL |
| 11 | Hexachlorobenzene | 0.013 | 0.010 | BQL |

Comments:
Sample specific quantitation limits may be calculated by multiplying the quantitation limit by the dilution factor.
BQL = Below Quantitation Limit

FORM N.C. TCLP-8270R Rev. 081892

Industrial & Environmental Analysts, Inc. (IEA)
TCLP/ZHE REGULATED GC/MS PURGEABLES
SW-846 METHOD 8240

| | | | |
|---|---|---|---|
| IEA Project Number: | 979-028 | | |
| IEA Sample Number: | 9604260-06 | Date Received: | 04/10/96 |
| Client Name: | Federal Paperboard Co. | Date Sampled: | 04/08/96 |
| Client Project I.D.: | Waste Stream Characteristics | Date Analyzed: | 04/26/96 |
| Sample Identification: | 6 | Analysis By: | CREWES |
| Matrix: | WATER | Dilution Factor: | 1.0 |
| TCLP Extraction Date: | 04/19/96 | | |

| Number | Compound | N.C. Regulatory Level (mg/L) | Quantitation Limit (mg/L) | Results Concentration (mg/L) |
|---|---|---|---|---|
| 1 | Benzene | 0.05 | 0.010 | BQL |
| 2 | 2-Butanone | 20 | 0.020 | BQL |
| 3 | Carbon tetrachloride | 0.05 | 0.010 | BQL |
| 4 | Chlorobenzene | 10 | 0.010 | BQL |
| 5 | Chloroform | 0.60 | 0.010 | BQL |
| 6 | 1,2-Dichloroethane | 0.05 | 0.010 | BQL |
| 7 | 1,1-Dichloroethene | 0.07 | 0.010 | BQL |
| 8 | Tetrachloroethene | 0.07 | 0.010 | BQL |
| 9 | Trichloroethene | 0.05 | 0.010 | BQL |
| 10 | Vinyl chloride | 0.02 | 0.020 | BQL |

Comments:
Sample specific quantitation limits may be calculated by multiplying the quantitation limit by the dilution factor.
BQL = Below Quantitation Limit

FORM NC-T824R Rev. 041895

Industrial & Environmental Analysts, Inc. (IEA)
Level 2 Metals Results Report
TCLP METALS REGULATED

IEA Project #: 979_028
IEA Sample #: 960426006
Client Name: Federal Paperboard Co.
Client Proj. I.D.: Waste Stream Characteristics
Sample I.D.: 6

Matrix: LEACHATE
Date Received: 04/10/96
Date Sampled: 04/08/96
TCLP Extraction: 04/17/96

| Parameter | Method | N.C. Regulatory Level | Quant Limit | Result ( ug/l) | Date Prepared | Date Analyzed | Analyst | IEA Run | Prep Batch |
|---|---|---|---|---|---|---|---|---|---|
| ARSENIC | SW846 6010 | 500 | 50.0 | BQL | 04/19/96 | 04/19/96 | FXW | R4989 | 04199603P |
| BARIUM | SW846 6010 | 10000 | 1000 | 2110 | 04/19/96 | 04/19/96 | FXW | R4989 | 04199603P |
| CADMIUM | SW846 6010 | 100 | 10.0 | BQL | 04/19/96 | 04/19/96 | FXW | R4989 | 04199603P |
| CHROMIUM | SW846 6010 | 500 | 50.0 | BQL | 04/19/96 | 04/19/96 | FXW | R4989 | 04199603P |
| LEAD | SW846 6010 | 500 | 50.0 | BQL | 04/19/96 | 04/19/96 | FXW | R4989 | 04199603P |
| MERCURY | SW846 7470 | 20 | 2.00 | BQL | 04/19/96 | 04/20/96 | MLH | R4982 | 04199602H |
| SELENIUM | SW846 7740 | 100 | 10.0 | BQL | 04/19/96 | 04/22/96 | RRM | R5028 | 04199603F |
| SILVER | SW846 6010 | 500 | 50.0 | BQL | 04/19/96 | 04/19/96 | FXW | R4989 | 04199603P |

Comments:

Industrial & Environmental Analysts, Inc. (IEA)

IEA Project #: 979-028
IEA Sample #: 9604260-06 Matrix: Soil
Client Name: Federal Paperboard Co. Date Received: 04/10/96
Client Proj. I.D.: Waste Stream Characteristics Date Sampled: 04/08/96
Sample I.D.: 6

| Parameter | Method | Quantitation Limits | Results | Date Prepared | Date Analyzed | Analyst |
|---|---|---|---|---|---|---|
| Ignitability | 46 FR 25193 | N/A | Non-Flammable | N/A | 04/16/96 | NB |
| pH | SW-846 9045 | 0.1 | 10.8 | N/A | 04/16/96 | NB |
| R-Cyanide | SW-846 CHAP 8.3 | 0.25 mg/kg | BQL | 04/26/96 | 04/26/96 | SJ |
| R-pH | SW-846 CHAP 8.3 | 0.1 | 10.8 | N/A | 04/16/96 | NB |
| R-Sulfide | SW-846 CHAP 8.3 | 25 mg/kg | BQL | 04/26/96 | 04/26/96 | PW |

Comments:

FORM RESP3 Rev. 030994

Industrial & Environmental Analysts, Inc. (IEA)
TCLP REGULATED PESTICIDES / PCBs
SW-846 METHOD 8080

| | | | |
|---|---|---|---|
| IEA Project Number: | 979-028 | Date Received: | 04/10/96 |
| IEA Sample Number: | 9604260-06 | Date Sampled: | 04/08/96 |
| Client Name: | Federal Paperboard Co. | Date Extracted: | 04/23/96 |
| Client Project ID: | Waste Stream Characteristics | Date Analyzed: | 04/27/96 |
| Sample Identification: | 6 | Analysis By: | Eurillo |
| Matrix: | Leachate | Dilution Factor: | 1.0 |
| TCLP Extraction Date: | 04/17/96 | | |

| Number | Compound | N.C. Regulatory Level (mg/L) | Quantitation Limit (mg/L) | Results Concentration (mg/L) |
|---|---|---|---|---|
| 1 | gamma-BHC (Lindane) | 0.04 | 0.00025 | BQL |
| 2 | Heptachlor | 0.0008 | 0.00025 | BQL |
| 3 | Heptachlor epoxide | 0.0008 | 0.00025 | BQL |
| 4 | Endrin | 0.002 | 0.00050 | BQL |
| 5 | Methoxychlor | 1.00 | 0.0025 | BQL |
| 6 | Toxaphene | 0.05 | 0.0050 | BQL |
| 7 | Chlordane (technical) | 0.003 | 0.0025 | BQL |

Comments:
Sample specific quantitation limits may be calculated by multiplying the quantitation limit by the dilution factor.
BQL = Below Quantitation Limit

FORM N.C. T8080R Rev. 030293

Industrial & Environmental Analysts, Inc. (IEA)
TCLP HERBICIDES REGULATED
METHOD 8150

| | | | |
|---|---|---|---|
| IEA Project Number: | 979-028 | | |
| IEA Sample Number: | 9604260-06 | Date Received: | 04/10/96 |
| Client Name: | Federal Paperboard Co. | Date Sampled: | 04/08/96 |
| Client Project I.D.: | Waste Stream Characteristics | Date Extracted: | 04/22/96 |
| Sample Identification: | 6 | Date Analyzed: | 05/03/96 |
| Matrix: | Leachate | Analysis By: | Eurillo |
| TCLP Extraction Date: | 04/17/96 | Dilution Factor: | 1.0 |

| Number | Compound | N.C. Regulatory Level (mg/L) | Quantitation Limit (mg/L) | Results Concentration (mg/L) |
|---|---|---|---|---|
| 1 | 2,4-D | 1.00 | 0.010 | BQL |
| 2 | 2,4,5-TP | 0.10 | 0.0020 | BQL |

Comments:
Sample specific quantitation limits may be calculated by multiplying the quantitation limit by the dilution factor.
BQL = Below Quantitation Limit

FORM N.C. THERBR Rev. 030293

Industrial & Environmental Analysts, Inc. (IEA)
TCLP/ZHE REGULATED GC/MS PURGEABLES
SW-846 METHOD 8240

| | | | |
|---|---|---|---|
| IEA Project Number: | 979-028 | | |
| IEA Sample Number: | 9604259 | Date Received: | N/A |
| Client Name: | Federal Paperboard Co. | Date Sampled: | N/A |
| Client Project I.D.: | Waste Stream Characteristics | Date Analyzed: | 04/26/96 |
| Sample Identification: | QC BLANK (VBLK5S) | Analysis By: | MOORE |
| Matrix: | WATER | Dilution Factor: | 1.0 |
| TCLP Extraction Date: | N/A | | |

| Number | Compound | N.C. Regulatory Level (mg/L) | Quantitation Limit (mg/L) | Results Concentration (mg/L) |
|---|---|---|---|---|
| 1 | Benzene | 0.05 | 0.010 | BQL |
| 2 | 2-Butanone | 20 | 0.020 | BQL |
| 3 | Carbon tetrachloride | 0.05 | 0.010 | BQL |
| 4 | Chlorobenzene | 10 | 0.010 | BQL |
| 5 | Chloroform | 0.60 | 0.010 | BQL |
| 6 | 1,2-Dichloroethane | 0.05 | 0.010 | BQL |
| 7 | 1,1-Dichloroethene | 0.07 | 0.010 | BQL |
| 8 | Tetrachloroethene | 0.07 | 0.010 | BQL |
| 9 | Trichloroethene | 0.05 | 0.010 | BQL |
| 10 | Vinyl chloride | 0.02 | 0.020 | BQL |

Comments:
Sample specific quantitation limits may be calculated by multiplying the quantitation limit by the dilution factor.
BQL = Below Quantitation Limit
N/A = Not Applicable
Corresponding Samples: 9604259-01, 01LS, 02, 05
Filename: 0426503

FORM NC-T824R Rev. 041895

Industrial & Environmental Analysts, Inc. (IEA)
TCLP/ZHE REGULATED GC/MS PURGEABLES
SW-846 METHOD 8240

| | | | |
|---|---|---|---|
| IEA Project Number: | 979-028 | | |
| IEA Sample Number: | 9604259 | Date Received: | N/A |
| Client Name: | Federal Paperboard Co. | Date Sampled: | N/A |
| Client Project I.D.: | Waste Stream Characteristics | Date Analyzed: | 04/26/96 |
| Sample Identification: | QC BLANK (VBLKJH) | Analysis By: | MOORE |
| Matrix: | WATER | Dilution Factor: | 1.0 |
| TCLP Extraction Date: | N/A | | |

| Number | Compound | N.C. Regulatory Level (mg/L) | Quantitation Limit (mg/L) | Results Concentration (mg/L) |
|---|---|---|---|---|
| 1 | Benzene | 0.05 | 0.010 | BQL |
| 2 | 2-Butanone | 20 | 0.020 | BQL |
| 3 | Carbon tetrachloride | 0.05 | 0.010 | BQL |
| 4 | Chlorobenzene | 10 | 0.010 | BQL |
| 5 | Chloroform | 0.60 | 0.010 | BQL |
| 6 | 1,2-Dichloroethane | 0.05 | 0.010 | BQL |
| 7 | 1,1-Dichloroethene | 0.07 | 0.010 | BQL |
| 8 | Tetrachloroethene | 0.07 | 0.010 | BQL |
| 9 | Trichloroethene | 0.05 | 0.010 | BQL |
| 10 | Vinyl chloride | 0.02 | 0.020 | BQL |

Comments:
Sample specific quantitation limits may be calculated by multiplying the quantitation limit by the dilution factor.
BQL = Below Quantitation Limit
N/A = Not Applicable
Corresponding Samples: 9604259-03,04, 9604260-06, ZHE BLK#750
Filename: 0426503

FORM NC-T824R Rev. 041895

Industrial & Environmental Analysts, Inc. (IEA)
TCLP/ZHE REGULATED GC/MS PURGEABLES
SW-846 METHOD 8240

| | | | |
|---|---|---|---|
| IEA Project Number: | 979-028 | | |
| IEA Sample Number: | 9604259 | Date Received: | N/A |
| Client Name: | Federal Paperboard Co. | Date Sampled: | N/A |
| Client Project I.D.: | Waste Stream Characteristics | Date Analyzed: | 04/26/96 |
| Sample Identification: | ZHE BLK#750 | Analysis By: | MOORE |
| Matrix: | WATER | Dilution Factor: | 1.0 |
| TCLP Extraction Date: | 04/19/96 | | |

| Number | Compound | N.C. Regulatory Level (mg/L) | Quantitation Limit (mg/L) | Results Concentration (mg/L) |
|---|---|---|---|---|
| 1 | Benzene | 0.05 | 0.010 | BQL |
| 2 | 2-Butanone | 20 | 0.020 | BQL |
| 3 | Carbon tetrachloride | 0.05 | 0.010 | BQL |
| 4 | Chlorobenzene | 10 | 0.010 | BQL |
| 5 | Chloroform | 0.60 | 0.010 | BQL |
| 6 | 1,2-Dichloroethane | 0.05 | 0.010 | BQL |
| 7 | 1,1-Dichloroethene | 0.07 | 0.010 | BQL |
| 8 | Tetrachloroethene | 0.07 | 0.010 | BQL |
| 9 | Trichloroethene | 0.05 | 0.010 | BQL |
| 10 | Vinyl chloride | 0.02 | 0.020 | BQL |

Comments:
Sample specific quantitation limits may be calculated by multiplying the quantitation limit by the dilution factor.
BQL = Below Quantitation Limit
N/A = Not Applicable
Corresponding Samples: 9604259-01,01LS through -05, 9604260-06
Filename: 0426106

FORM NC-T824R Rev. 041895

Industrial & Environmental Analysts, Inc. (IEA)

IEA Project #: 979-028
IEA Sample #: 9604259 Matrix: Solid
Client Name: Federal Paperboard Co. Date Received: N/A
Client Proj. I.D.: Waste Stream Characteristics Date Sampled: N/A
Sample I.D.: QC Blank

| Parameter | Method | Quantitation Limits | Results | Date Prepared | Date Analyzed | Analyst |
|---|---|---|---|---|---|---|
| R-Cyanide | SW-846 CHAP 8.3 | 0.25 mg/kg | BQL | 04/26/96 | 04/26/96 | SJ |
| R-Sulfide | SW-846 CHAP 8.3 | 25 mg/kg | BQL | 04/26/96 | 04/26/96 | PW |

Comments:

Corresponding Samples: 9604259-01 through 05 and 9604260-06

FORM RESP3 Rev. 030994

Industrial & Environmental Analysts, Inc. (IEA)
TCLP REGULATED
BASE/NEUTRAL/ACID EXTRACTABLES SW-846 METHOD 8270

| | | | |
|---|---|---|---|
| IEA Project Number: | 979-028 | | |
| IEA Sample Number: | 9604259 | Date Received: | N/A |
| Client Name: | Federal Paperboard Co. | Date Sampled: | N/A |
| Client Project I.D.: | Waste Stream Characteristics | Date Extracted: | 04/19/96 |
| Sample Identification: | QC Blank (SVB351) | Date Analyzed: | 04/22/96 |
| Matrix: | Water | Analysis By: | Van Lare |
| TCLP Extraction Date: | N/A | Dilution Factor: | 1.0 |

| Number | Compound | N.C. Regulatory Level (mg/L) | Quantitation Limit (mg/L) | Results Concentration (mg/L) |
|---|---|---|---|---|
| 1 | 1,4-Dichlorobenzene | 0.75 | 0.010 | BQL |
| 2 | 2,4-Dinitrotoluene | 0.013 | 0.010 | BQL |
| 3 | Hexachlorobutadiene | 0.05 | 0.010 | BQL |
| 4 | Hexachloroethane | 0.30 | 0.010 | BQL |
| 5 | Total Cresol | 20 | 0.010 | BQL |
| 6 | Nitrobenzene | 0.20 | 0.010 | BQL |
| 7 | Pentachlorophenol | 10 | 0.050 | BQL |
| 8 | Pyridine | 0.50 | 0.010 | BQL |
| 9 | 2,4,5-Trichlorophenol | 40 | 0.010 | BQL |
| 10 | 2,4,6-Trichlorophenol | 0.20 | 0.010 | BQL |
| 11 | Hexachlorobenzene | 0.013 | 0.010 | BQL |

Comments:
Sample specific quantitation limits may be calculated by multiplying the quantitation limit by the dilution factor.
BQL = Below Quantitation Limit
N/A = Not Applicable
Corresponding Samples: TCLP556, 9604259-01, 01SPK, 02, 04, 05, 9604260-06
Filename: 0422402
FORM N.C. TCLP-8270R Rev. 081892

Industrial & Environmental Analysts, Inc. (IEA)
TCLP REGULATED
BASE/NEUTRAL/ACID EXTRACTABLES SW-846 METHOD 8270

| | | | |
|---|---|---|---|
| IEA Project Number: | 979-028 | | |
| IEA Sample Number: | 9604259 | Date Received: | N/A |
| Client Name: | Federal Paperboard Co. | Date Sampled: | N/A |
| Client Project I.D.: | Waste Stream Characteristics | Date Extracted: | 04/19/96 |
| Sample Identification: | Method Blank (TCLP556) | Date Analyzed: | 04/22/96 |
| Matrix: | Leachate | Analysis By: | Van Lare |
| TCLP Extraction Date: | 04/17/96 | Dilution Factor: | 1.0 |

| Number | Compound | N.C. Regulatory Level (mg/L) | Quantitation Limit (mg/L) | Results Concentration (mg/L) |
|---|---|---|---|---|
| 1 | 1,4-Dichlorobenzene | 0.75 | 0.010 | BQL |
| 2 | 2,4-Dinitrotoluene | 0.013 | 0.010 | BQL |
| 3 | Hexachlorobutadiene | 0.05 | 0.010 | BQL |
| 4 | Hexachloroethane | 0.30 | 0.010 | BQL |
| 5 | Total Cresol | 20 | 0.010 | BQL |
| 6 | Nitrobenzene | 0.20 | 0.010 | BQL |
| 7 | Pentachlorophenol | 10 | 0.050 | BQL |
| 8 | Pyridine | 0.50 | 0.010 | BQL |
| 9 | 2,4,5-Trichlorophenol | 40 | 0.010 | BQL |
| 10 | 2,4,6-Trichlorophenol | 0.20 | 0.010 | BQL |
| 11 | Hexachlorobenzene | 0.013 | 0.010 | BQL |

Comments:
Sample specific quantitation limits may be calculated by multiplying the quantitation limit by the dilution factor.
BQL = Below Quantitation Limit
N/A = Not Applicable
Corresponding Samples: 9604259-01, 02, 04, 05, 9604260-06
Filename: 0422408
FORM N.C. TCLP-8270R Rev. 081892

Industrial & Environmental Analysts, Inc. (IEA)
TCLP REGULATED
BASE/NEUTRAL/ACID EXTRACTABLES SW-846 METHOD 8270

| | | | |
|---|---|---|---|
| IEA Project Number: | 979-028 | | |
| IEA Sample Number: | 9604259 | Date Received: | N/A |
| Client Name: | Federal Paperboard Co. | Date Sampled: | N/A |
| Client Project I.D.: | Waste Stream Characteristics | Date Extracted: | 04/22/96 |
| Sample Identification: | QC Blank (SVB354) | Date Analyzed: | 04/23/96 |
| Matrix: | Water | Analysis By: | Dixon |
| TCLP Extraction Date: | N/A | Dilution Factor: | 1.0 |

| Number | Compound | N.C. Regulatory Level (mg/L) | Quantitation Limit (mg/L) | Results Concentration (mg/L) |
|---|---|---|---|---|
| 1 | 1,4-Dichlorobenzene | 0.75 | 0.010 | BQL |
| 2 | 2,4-Dinitrotoluene | 0.013 | 0.010 | BQL |
| 3 | Hexachlorobutadiene | 0.05 | 0.010 | BQL |
| 4 | Hexachloroethane | 0.30 | 0.010 | BQL |
| 5 | Total Cresol | 20 | 0.010 | BQL |
| 6 | Nitrobenzene | 0.20 | 0.010 | BQL |
| 7 | Pentachlorophenol | 10 | 0.050 | BQL |
| 8 | Pyridine | 0.50 | 0.010 | BQL |
| 9 | 2,4,5-Trichlorophenol | 40 | 0.010 | BQL |
| 10 | 2,4,6-Trichlorophenol | 0.20 | 0.010 | BQL |
| 11 | Hexachlorobenzene | 0.013 | 0.010 | BQL |

Comments:
Sample specific quantitation limits may be calculated by multiplying the quantitation limit by the dilution factor.
BQL = Below Quantitation Limit
N/A = Not Applicable
Corresponding Samples: TCLP564, 9604259-03, 03SPK
Filename: 0422D03
FORM N.C. TCLP-8270R Rev. 081892

Industrial & Environmental Analysts, Inc. (IEA)
TCLP REGULATED
BASE/NEUTRAL/ACID EXTRACTABLES SW-846 METHOD 8270

| | | | |
|---|---|---|---|
| IEA Project Number: | 979-028 | | |
| IEA Sample Number: | 9604259 | Date Received: | N/A |
| Client Name: | Federal Paperboard Co. | Date Sampled: | N/A |
| Client Project I.D.: | Waste Stream Characteristics | Date Extracted: | 04/22/96 |
| Sample Identification: | Method Blank (TCLP564) | Date Analyzed: | 04/23/96 |
| Matrix: | Leachate | Analysis By: | Dixon |
| TCLP Extraction Date: | 04/19/96 | Dilution Factor: | 1.0 |

| Number | Compound | N.C. Regulatory Level (mg/L) | Quantitation Limit (mg/L) | Results Concentration (mg/L) |
|---|---|---|---|---|
| 1 | 1,4-Dichlorobenzene | 0.75 | 0.010 | BQL |
| 2 | 2,4-Dinitrotoluene | 0.013 | 0.010 | BQL |
| 3 | Hexachlorobutadiene | 0.05 | 0.010 | BQL |
| 4 | Hexachloroethane | 0.30 | 0.010 | BQL |
| 5 | Total Cresol | 20 | 0.010 | BQL |
| 6 | Nitrobenzene | 0.20 | 0.010 | BQL |
| 7 | Pentachlorophenol | 10 | 0.050 | BQL |
| 8 | Pyridine | 0.50 | 0.010 | BQL |
| 9 | 2,4,5-Trichlorophenol | 40 | 0.010 | BQL |
| 10 | 2,4,6-Trichlorophenol | 0.20 | 0.010 | BQL |
| 11 | Hexachlorobenzene | 0.013 | 0.010 | BQL |

Comments:
Sample specific quantitation limits may be calculated by multiplying the quantitation limit by the dilution factor.
BQL = Below Quantitation Limit
N/A = Not Applicable
Corresponding Sample: 9604259-03
Filename: 0422D02
FORM N.C. TCLP-8270R Rev. 081892

Industrial & Environmental Analysts, Inc. (IEA)
TCLP SEMIVOLATILE MATRIX SPIKE

IEA Project No.: 979-028
IEA Sample ID: 9604259-01
Date Extracted: 04/19/96
Date Analyzed: 04/23/96

| COMPOUND | QUANTITATION LIMIT (mg/L) | SAMPLE CONCENTRATION (mg/L) | MS % REC # |
|---|---|---|---|
| 1,4-Dichlorobenzene | 0.020 | BQL | 70 |
| 2,4-Dinitrotoluene | 0.020 | BQL | 82 |
| Hexachlorobutadiene | 0.020 | BQL | 77 |
| Hexachloroethane | 0.020 | BQL | 70 |
| Total Cresol | 0.020 | BQL | 72 |
| Nitrobenzene | 0.020 | BQL | 80 |
| Pentachlorophenol | 0.100 | BQL | 97 |
| Pyridine | 0.020 | BQL | 46 |
| 2,4,5-Trichlorophenol | 0.020 | BQL | 87 |
| 2,4,6-Trichlorophenol | 0.020 | BQL | 85 |
| Hexachlorobenzene | 0.020 | BQL | 73 |

Comments:
BQL = Below Quantitation Limit

FORM TWASEMMA Rev. 041291

Industrial & Environmental Analysts, Inc. (IEA)
TCLP SEMIVOLATILE MATRIX SPIKE

IEA Project No.: 979-028
IEA Sample ID: 9604259-03
Date Extracted: 04/22/96
Date Analyzed: 04/23/96

| COMPOUND | QUANTITATION LIMIT (mg/L) | SAMPLE CONCENTRATION (mg/L) | MS % REC # |
|---|---|---|---|
| 1,4-Dichlorobenzene | 0.020 | BQL | 62 |
| 2,4-Dinitrotoluene | 0.020 | BQL | 77 |
| Hexachlorobutadiene | 0.020 | BQL | 71 |
| Hexachloroethane | 0.020 | BQL | 65 |
| Total Cresol | 0.020 | BQL | 77 |
| Nitrobenzene | 0.020 | BQL | 91 |
| Pentachlorophenol | 0.100 | BQL | 90 |
| Pyridine | 0.020 | BQL | 52 |
| 2,4,5-Trichlorophenol | 0.020 | BQL | 84 |
| 2,4,6-Trichlorophenol | 0.020 | BQL | 87 |
| Hexachlorobenzene | 0.020 | BQL | 70 |

Comments:
BQL = Below Quantitation Limit
Sample was diluted due to the high concentration of non-target compounds present.

FORM TWASEMMA Rev. 041291

Industrial & Environmental Analysts, Inc. (IEA)
TCLP VOLATILE MATRIX SPIKE

IEA Project No.: 979-028
IEA Sample ID: 9604259-01LS
Sample Identification: 1LS
Analysis Date: 04/26/96

| COMPOUND | QUANTITATION LIMIT (mg/L) | SAMPLE CONCENTRATION (mg/L) | MS % REC # |
|---|---|---|---|
| Benzene | 0.010 | BQL | >100 |
| 2-Butanone | 0.020 | BQL | >100 |
| Carbon tetrachloride | 0.010 | BQL | >100 |
| Chlorobenzene | 0.010 | BQL | >100 |
| Chloroform | 0.010 | BQL | >100 |
| 1,2-Dichloroethane | 0.010 | BQL | >100 |
| 1,1-Dichloroethene | 0.010 | BQL | >100 |
| Tetrachloroethene | 0.010 | BQL | >100 |
| Trichloroethene | 0.010 | BQL | >100 |
| Vinyl chloride | 0.020 | BQL | >100 |

Comments:

BQL = Below Quantitation Limit

FORM TWAVOLMA Rev. 051691

Industrial & Environmental Analysts, Inc. (IEA)
Level 2 Metals Results Report
PREPARATION BLANKS

IEA Project #: 979_028
Matrix: LEACHATE
Client Name: Federal Paperboard Co.
Client Proj. I.D.: Waste Stream Characteristics
Sample Number: PBW 04199602H

| Parameter | Method | Quant Limit | Result (ug/l ) | Date Prepared | Date Analyzed | Analyst | IEA Run | Prep Batch |
|---|---|---|---|---|---|---|---|---|
| MERCURY | SW846 7470 | 2.00 | BQL | 04/19/96 | 04/20/96 | MLH | R4982 | 04199602H |

Corresponding Samples:
960425901, 960425902, 960425904, 960425905, 960426006, 960434401, 960434402

Comments:

Industrial & Environmental Analysts, Inc. (IEA)
Level 2 Metals Results Report
PREPARATION BLANKS

IEA Project #: 979_028
Matrix: LEACHATE
Client Name: Federal Paperboard Co.
lient Proj. I.D.: Waste Stream Characteristics
Sample Number: PBW 04199603F

| arameter | Method | Quant Limit | Result (ug/l ) | Date Prepared | Date Analyzed | Analyst | IEA Run | Prep Batch |
|---|---|---|---|---|---|---|---|---|
| LENIUM | SW846 7740 | 10.0 | BQL | 04/19/96 | 04/22/96 | RRM | R5027 | 04199603F |

Corresponding Samples:
960425901, 960425902, 960425904, 960425905, 960426006

Comments:

Industrial & Environmental Analysts, Inc. (IEA)
Level 2 Metals Results Report
PREPARATION BLANKS

IEA Project #: 979_028
Matrix: LEACHATE
Client Name: Federal Paperboard Co.
Client Proj. I.D.: Waste Stream Characteristics
Sample Number: PBW 04199603P

| Parameter | Method | Quant Limit | Result (ug/l ) | Date Prepared | Date Analyzed | Analyst | IEA Run | Prep Batch |
|---|---|---|---|---|---|---|---|---|
| ARSENIC | SW846 6010 | 50.0 | BQL | 04/19/96 | 04/19/96 | FXW | R4989 | 04199603P |
| BARIUM | SW846 6010 | 1000 | BQL | 04/19/96 | 04/19/96 | FXW | R4989 | 04199603P |
| CADMIUM | SW846 6010 | 10.0 | BQL | 04/19/96 | 04/19/96 | FXW | R4989 | 04199603P |
| CHROMIUM | SW846 6010 | 50.0 | BQL | 04/19/96 | 04/19/96 | FXW | R4989 | 04199603P |
| LEAD | SW846 6010 | 50.0 | BQL | 04/19/96 | 04/19/96 | FXW | R4989 | 04199603P |
| SILVER | SW846 6010 | 50.0 | BQL | 04/19/96 | 04/19/96 | FXW | R4989 | 04199603P |

Corresponding Samples:
960425901, 960425902, 960425904, 960425905, 960426006

Comments:

Industrial & Environmental Analysts, Inc. (IEA)
Level 2 Metals Results Report
PREPARATION BLANKS

IEA Project #: 979_028
Matrix: LEACHATE
Client Name: Federal Paperboard Co.
Client Proj. I.D.: Waste Stream Characteristics
Sample Number: PBW 04249608P

| Parameter | Method | Quant Limit | Result (ug/l ) | Date Prepared | Date Analyzed | Analyst | IEA Run | Prep Batch |
|---|---|---|---|---|---|---|---|---|
| ARSENIC | SW846 6010 | 50.0 | BQL | 04/24/96 | 04/29/96 | RRM | R5099 | 04249608P |
| BARIUM | SW846 6010 | 1000 | BQL | 04/24/96 | 04/29/96 | RRM | R5099 | 04249608P |
| CADMIUM | SW846 6010 | 10.0 | BQL | 04/24/96 | 04/29/96 | RRM | R5099 | 04249608P |
| CHROMIUM | SW846 6010 | 50.0 | BQL | 04/24/96 | 04/29/96 | RRM | R5099 | 04249608P |
| LEAD | SW846 6010 | 50.0 | BQL | 04/24/96 | 04/29/96 | RRM | R5099 | 04249608P |
| SILVER | SW846 6010 | 50.0 | BQL | 04/24/96 | 04/29/96 | RRM | R5099 | 04249608P |

Corresponding Samples:
960425903

Comments:

Industrial & Environmental Analysts, Inc. (IEA)
Level 2 Metals Results Report
PREPARATION BLANKS

IEA Project #: 979_028
Matrix: LEACHATE
Client Name: Federal Paperboard Co.
Client Proj. I.D.: Waste Stream Characteristics
Sample Number: PBW 04229601H

| Parameter | Method | Quant Limit | Result (ug/l ) | Date Prepared | Date Analyzed | Analyst | IEA Run | Prep Batch |
|---|---|---|---|---|---|---|---|---|
| MERCURY | SW846 7470 | 2.00 | BQL | 04/22/96 | 04/20/96 | LXG | R4984 | 04229601H |

Corresponding Samples:
960425903, 960434101, 960434102, 960434702, 960434703, 960434704, 960434705, 960434706, 960434707, 960434708, 960434709, 960434710, 960434711, 960436709

Comments:

Industrial & Environmental Analysts, Inc. (IEA)
Level 2 Metals Results Report
PREPARATION BLANKS

IEA Project #: 979_028
Matrix: LEACHATE
Client Name: Federal Paperboard Co.
Client Proj. I.D.: Waste Stream Characteristics
Sample Number: PBW 04249609F

| Parameter | Method | Quant Limit | Result (ug/l ) | Date Prepared | Date Analyzed | Analyst | IEA Run | Prep Batch |
|---|---|---|---|---|---|---|---|---|
| SELENIUM | SW846 7740 | 10.0 | BQL | 04/24/96 | 04/26/96 | RRM | R5082 | 04249609F |

Corresponding Samples:
960425903

Comments:

Industrial & Environmental Analysts, Inc. (IEA)
Level 2 Metals Results Report
PREPARATION BLANKS

IEA Project #: 979_028
Matrix: LEACHATE
Client Name: Federal Paperboard Co.
Client Proj. I.D.: Waste Stream Characteristics
Sample Number: TB556 04199602H

| Parameter | Method | Quant Limit | Result (ug/l ) | Date Prepared | Date Analyzed | Analyst | IEA Run | Prep Batch |
|---|---|---|---|---|---|---|---|---|
| MERCURY | SW846 7470 | 2.00 | BQL | 04/19/96 | 04/20/96 | MLH | R4982 | 04199602H |

Corresponding Samples:
960425901, 960425902, 960425904, 960425905, 960426006, 960434401, 960434402

Comments:

Industrial & Environmental Analysts, Inc. (IEA)
Level 2 Metals Results Report
PREPARATION BLANKS

IEA Project #: 979_028
Matrix: LEACHATE
Client Name: Federal Paperboard Co.
Client Proj. I.D.: Waste Stream Characteristics
Sample Number: TB556 04199603F

| Parameter | Method | Quant Limit | Result (ug/l ) | Date Prepared | Date Analyzed | Analyst | IEA Run | Prep Batch |
|---|---|---|---|---|---|---|---|---|
| SELENIUM | SW846 7740 | 10.0 | BQL | 04/19/96 | 04/22/96 | RRM | R5028 | 04199603F |

Corresponding Samples:
960425901, 960425902, 960425904, 960425905, 960426006

Comments:

Industrial & Environmental Analysts, Inc. (IEA)
Level 2 Metals Results Report
PREPARATION BLANKS

IEA Project #: 979_028
Matrix: LEACHATE
Client Name: Federal Paperboard Co.
Client Proj. I.D.: Waste Stream Characteristics
Sample Number: TB556 04199603P

| Parameter | Method | Quant Limit | Result (ug/l ) | Date Prepared | Date Analyzed | Analyst | IEA Run | Prep Batch |
|---|---|---|---|---|---|---|---|---|
| ARSENIC | SW846 6010 | 50.0 | BQL | 04/19/96 | 04/19/96 | FXW | R4989 | 04199603P |
| BARIUM | SW846 6010 | 1000 | BQL | 04/19/96 | 04/19/96 | FXW | R4989 | 04199603P |
| CADMIUM | SW846 6010 | 10.0 | BQL | 04/19/96 | 04/19/96 | FXW | R4989 | 04199603P |
| CHROMIUM | SW846 6010 | 50.0 | BQL | 04/19/96 | 04/19/96 | FXW | R4989 | 04199603P |
| LEAD | SW846 6010 | 50.0 | BQL | 04/19/96 | 04/19/96 | FXW | R4989 | 04199603P |
| SILVER | SW846 6010 | 50.0 | BQL | 04/19/96 | 04/19/96 | FXW | R4989 | 04199603P |

Corresponding Samples:
960425901, 960425902, 960425904, 960425905, 960426006

Comments:

Industrial & Environmental Analysts, Inc. (IEA)
Level 2 Metals Results Report
PREPARATION BLANKS

IEA Project #: 979_028
Matrix: LEACHATE
Client Name: Federal Paperboard Co.
Client Proj. I.D.: Waste Stream Characteristics
Sample Number: TB564 04229601H

| Parameter | Method | Quant Limit | Result (ug/l ) | Date Prepared | Date Analyzed | Analyst | IEA Run | Prep Batch |
|---|---|---|---|---|---|---|---|---|
| MERCURY | SW846 7470 | 2.00 | BQL | 04/22/96 | 04/20/96 | LXG | R4984 | 04229601H |

Corresponding Samples:
960425903, 960434101, 960434102, 960434702, 960434703, 960434704, 960434705, 960434706, 960434707, 960434708, 960434709, 960434710, 960434711, 960436709

Comments:

Industrial & Environmental Analysts, Inc. (IEA)
Level 2 Metals Results Report
PREPARATION BLANKS

IEA Project #: 979_028
Matrix: LEACHATE
Client Name: Federal Paperboard Co.
Client Proj. I.D.: Waste Stream Characteristics
Sample Number: TB564 04249609F

| Parameter | Method | Quant Limit | Result (ug/l ) | Date Prepared | Date Analyzed | Analyst | IEA Run | Prep Batch |
|---|---|---|---|---|---|---|---|---|
| SELENIUM | SW846 7740 | 10.0 | BQL | 04/24/96 | 04/26/96 | RRM | R5082 | 04249609F |

Corresponding Samples:
960425903

Comments:

Industrial & Environmental Analysts, Inc. (IEA)
Level 2 Metals Results Report
PREPARATION BLANKS

IEA Project #: 979_028
Matrix: LEACHATE
Client Name: Federal Paperboard Co.
Client Proj. I.D.: Waste Stream Characteristics
Sample Number: TB565 04229601H

| Parameter | Method | Quant Limit | Result (ug/l ) | Date Prepared | Date Analyzed | Analyst | IEA Run | Prep Batch |
|---|---|---|---|---|---|---|---|---|
| MERCURY | SW846 7470 | 2.00 | BQL | 04/22/96 | 04/20/96 | LXG | R4984 | 04229601H |

Corresponding Samples:
960425903, 960434101, 960434102, 960434702, 960434703, 960434704, 960434705, 960434706, 960434707, 960434708, 960434709, 960434710, 960434711, 960436709

Comments:

Industrial & Environmental Analysts, Inc. (IEA)
Level 2 Metals Results Report
MATRIX SPIKE RESULTS

EA Project #: 979_028
IEA Sample #: 960425902
Matrix: LEACHATE

Matrix Spike Results ( ug/l)

| arameter | Method | SA | SR | SSR | %RCY | Date Analyzed | Samp Run | Spike Run |
|---|---|---|---|---|---|---|---|---|
| ARSENIC | SW846 6010 | 556. | BQL | 412. | 74.2 | 04/19/96 | R4989 | R4989 |
| ARIUM | SW846 6010 | 11100 | 1550 | 10600 | 81.4 | 04/19/96 | R4989 | R4989 |
| ADMIUM | SW846 6010 | 111. | BQL | 81.6 | 73.4 | 04/19/96 | R4989 | R4989 |
| CHROMIUM | SW846 6010 | 556. | BQL | 425. | 76.5 | 04/19/96 | R4989 | R4989 |
| LEAD | SW846 6010 | 556. | BQL | 421. | 75.8 | 04/19/96 | R4989 | R4989 |
| ERCURY | SW846 7470 | 20.0 | BQL | 16.9 | 82.4 | 04/20/96 | R4982 | R4982 |
| ELENIUM | SW846 7740 | 111. | BQL | 86.7 | 78.1 | 04/24/96 | R5103 | R5103 |
| SILVER | SW846 6010 | 556. | BQL | 408. | 73.4 | 04/19/96 | R4989 | R4989 |

%R = ((SSR - SR) / SA) * 100

orresponding Samples:
960425901, 960425902, 960425904, 960425905, 960426006, 960434401, 960434402

omments:

Industrial & Environmental Analysts, Inc. (IEA)
Level 2 Metals Results Report
MATRIX SPIKE RESULTS

EA Project #: 979_028
IEA Sample #: 960425903
Matrix: LEACHATE

Matrix Spike Results ( ug/l)

| arameter | Method | SA | SR | SSR | %RCY | Date Analyzed | Samp Run | Spike Run |
|---|---|---|---|---|---|---|---|---|
| RSENIC | SW846 6010 | 500. | 391. | 417. | 5.11 | 04/29/96 | R5099 | R5099 |
| ARIUM | SW846 6010 | 10000 | 7720 | 8290 | 5.75 | 04/29/96 | R5099 | R5099 |
| ADMIUM | SW846 6010 | 100. | 80.2 | 79.4 | -0.8 | 04/29/96 | R5099 | R5099 |
| CHROMIUM | SW846 6010 | 500. | 401. | 392. | -1.8 | 04/29/96 | R5099 | R5099 |
| EAD | SW846 6010 | 500. | 355. | 388. | 6.56 | 04/29/96 | R5099 | R5099 |
| ERCURY | SW846 7470 | 20.0 | BQL | 13.0 | 63.7 | 04/20/96 | R4984 | R4984 |
| ELENIUM | SW846 7740 | 100. | BQL | 56.0 | 56.0 | 04/26/96 | R5082 | R5082 |
| ILVER | SW846 6010 | 500. | 357. | 375. | 3.62 | 04/29/96 | R5099 | R5099 |

%R = ((SSR - SR) / SA) * 100

orresponding Samples:
960425903, 960434101, 960434102, 960434702, 960434703, 960434704, 960434705, 960434706, 960434707, 960434708, 960434709, 960434710, 960434711, 960436709

Comments:

## ABBREVIATIONS

| | | |
|---|---|---|
| A | = | Amenable |
| Alk | = | Alkalinity as CaCO3 |
| Bcrb | = | Alkalinity as Bicarbonate |
| BOD | = | Biochemical Oxygen Demand |
| BQL | = | Below Quantitation Limit |
| c/100mL | = | Colonies per 100 mL of Sample |
| CEC | = | Cation Exchange Capacity |
| Chrom | = | Chromotropic |
| COD | = | Chemical Oxygen Demand |
| Crb | = | Alkalinity as Carbonate |
| D | = | Dissolved |
| DO | = | Dissolved Oxygen |
| DOC | = | Dissolved Organic Carbon |
| D/T | = | Distillation/Titration |
| E | = | Extractable (Prepped by Std M 3030C) |
| F | = | Free |
| Hex | = | Hexavalent |
| Hyd | = | Hydroxide |
| ISE | = | Ion Selective Electrode |
| mmpy | = | Millimeter per Year |
| MPN | = | Most Probable Number |
| N/A | = | Not Applicable |
| R | = | Reactivity |
| SA | = | Spike Added |
| SSR | = | Spike Sample Results |
| SR | = | Sample Results |
| Sp Cond | = | Specific Conductance |
| SM | = | Settleable Matter |
| SPC | = | Standard Plate Count |
| T | = | Total |
| TDS | = | Total Dissolved Solids |
| TKN | = | Total Kjeldahl Nitrogen |
| TMLSS | = | Total Mixed Liquor Suspended Solids |
| TOC | = | Total Organic Carbon |
| TON | = | Total Organic Nitrogen |
| TOX | = | Total Organic Halogens |
| TS | = | Total Solids |
| TSS | = | Total Suspended Solids |
| TVS | = | Total Volatile Solids |
| VSS | = | Volatile Suspended Solids |
| WAD | = | Weak and Dissociable |

Industrial & Environmental Analysts, Inc. (IEA)
TCLP REGULATED PESTICIDES / PCBs
SW-846 METHOD 8080

| | | | |
|---|---|---|---|
| IEA Project Number: | 979-028 | Date Received: | N/A |
| IEA Sample Number: | 9604259 | Date Sampled: | N/A |
| Client Name: | Federal Paperboard Co. | Date Extracted: | 04/23/96 |
| Client Project ID: | Waste Stream Characteristics | Date Analyzed: | 04/27/96 |
| Sample Identification: | QC Blank (PB969) | Analysis By: | Cubbedge |
| Matrix: | Water | Dilution Factor: | 1.0 |
| TCLP Extraction Date: | N/A | | |

| Number | Compound | N.C. Regulatory Level (mg/L) | Quantitation Limit (mg/L) | Results Concentration (mg/L) |
|---|---|---|---|---|
| 1 | gamma-BHC (Lindane) | 0.04 | 0.00025 | BQL |
| 2 | Heptachlor | 0.0008 | 0.00025 | BQL |
| 3 | Heptachlor epoxide | 0.0008 | 0.00025 | BQL |
| 4 | Endrin | 0.002 | 0.00050 | BQL |
| 5 | Methoxychlor | 1.00 | 0.0025 | BQL |
| 6 | Toxaphene | 0.05 | 0.0050 | BQL |
| 7 | Chlordane (technical) | 0.003 | 0.0025 | BQL |

Comments:
Sample specific quantitation limits may be calculated by multiplying the quantitation limit by the dilution factor.
BQL = Below Quantitation Limit
N/A = Not Applicable
Corresponding Samples: TCLP556, TCLP564, 9604259-01 through -05, -01SPK, -03SPK, 9604260-06

FORM N.C. T8080R Rev. 030293

Industrial & Environmental Analysts, Inc. (IEA)
TCLP REGULATED PESTICIDES / PCBs
SW-846 METHOD 8080

| | | | |
|---|---|---|---|
| IEA Project Number: | 979-028 | Date Received: | N/A |
| IEA Sample Number: | 9604259 | Date Sampled: | N/A |
| Client Name: | Federal Paperboard Co. | Date Extracted: | 04/23/96 |
| Client Project ID: | Waste Stream Characteristics | Date Analyzed: | 04/27/96 |
| Sample Identification: | Method Blank (TCLP556) | Analysis By: | Cubbedge |
| Matrix: | Leachate | Dilution Factor: | 1.0 |
| TCLP Extraction Date: | 04/17/96 | | |

| Number | Compound | N.C. Regulatory Level (mg/L) | Quantitation Limit (mg/L) | Results Concentration (mg/L) |
|---|---|---|---|---|
| 1 | gamma-BHC (Lindane) | 0.04 | 0.00025 | BQL |
| 2 | Heptachlor | 0.0008 | 0.00025 | BQL |
| 3 | Heptachlor epoxide | 0.0008 | 0.00025 | BQL |
| 4 | Endrin | 0.002 | 0.00050 | BQL |
| 5 | Methoxychlor | 1.00 | 0.0025 | BQL |
| 6 | Toxaphene | 0.05 | 0.0050 | BQL |
| 7 | Chlordane (technical) | 0.003 | 0.0025 | BQL |

Comments:
Sample specific quantitation limits may be calculated by multiplying the quantitation limit by the dilution factor.
BQL = Below Quantitation Limit
N/A = Not Applicable
Corresponding Samples: 9604259-01, -02, -04, -05, 9604260-06

FORM N.C. T8080R Rev. 030293

Industrial & Environmental Analysts, Inc. (IEA)
TCLP REGULATED PESTICIDES / PCBs
SW-846 METHOD 8080

| | | | |
|---|---|---|---|
| IEA Project Number: | 979-028 | Date Received: | N/A |
| IEA Sample Number: | 9604259 | Date Sampled: | N/A |
| Client Name: | Federal Paperboard Co. | Date Extracted: | 04/23/96 |
| Client Project ID: | Waste Stream Characteristics | Date Analyzed: | 04/27/96 |
| Sample Identification: | Method Blank (TCLP564) | Analysis By: | Cubbedge |
| Matrix: | Leachate | Dilution Factor: | 1.0 |
| TCLP Extraction Date: | 04/19/96 | | |

| Number | Compound | N.C. Regulatory Level (mg/L) | Quantitation Limit (mg/L) | Results Concentration (mg/L) |
|---|---|---|---|---|
| 1 | gamma-BHC (Lindane) | 0.04 | 0.00025 | BQL |
| 2 | Heptachlor | 0.0008 | 0.00025 | BQL |
| 3 | Heptachlor epoxide | 0.0008 | 0.00025 | BQL |
| 4 | Endrin | 0.002 | 0.00050 | BQL |
| 5 | Methoxychlor | 1.00 | 0.0025 | BQL |
| 6 | Toxaphene | 0.05 | 0.0050 | BQL |
| 7 | Chlordane (technical) | 0.003 | 0.0025 | BQL |

Comments:
Sample specific quantitation limits may be calculated by multiplying the quantitation limit by the dilution factor.
BQL = Below Quantitation Limit
N/A = Not Applicable
Corresponding Sample: 9604259-03

FORM N.C. T8080R Rev. 030293

Industrial & Environmental Analysts, Inc. (IEA)
TCLP PESTICIDE MATRIX SPIKE

IEA Project ID: 979-028
IEA Sample ID: 9604259-01
Date Extracted: 04/23/96
Date Analyzed: 04/27/96

| COMPOUND | QUANTITATION LIMIT (mg/L) | SAMPLE CONCENTRATION (mg/L) | MS % REC # |
|---|---|---|---|
| gamma-BHC (Lindane) | 0.00025 | BQL | 42 |
| Heptachlor | 0.00025 | BQL | 93 |
| Heptachlor epoxide | 0.00025 | BQL | 80 |
| Endrin | 0.00050 | BQL | 105 |
| Methoxychlor | 0.0025 | BQL | 83 |
| Toxaphene | 0.0050 | BQL | 81 |
| Chlordane (technical) | 0.0025 | BQL | 81 |

Comments:

BQL = Below Quantitation Limit
*MS% Recovery for the multi-response pesticides is calculated as the av recovery of the single-response compounds (as per communication with t EPA Office of Solid Waste, Washington, D.C.)

FORM TPMSD Rev. 030293

Industrial & Environmental Analysts, Inc. (IEA)
TCLP PESTICIDE MATRIX SPIKE

IEA Project ID: 979-028
IEA Sample ID: 9604259-03
Date Extracted: 04/23/96
Date Analyzed: 04/27/96

| COMPOUND | QUANTITATION LIMIT (mg/L) | SAMPLE CONCENTRATION (mg/L) | MS % REC # |
|---|---|---|---|
| gamma-BHC (Lindane) | 0.00025 | BQL | 36 |
| Heptachlor | 0.00025 | BQL | 80 |
| Heptachlor epoxide | 0.00025 | BQL | 87 |
| Endrin | 0.00050 | BQL | 135 |
| Methoxychlor | 0.0025 | BQL | 90 |
| Toxaphene | 0.0050 | BQL | 84 |
| Chlordane (technical) | 0.0025 | BQL | 84 |

Comments:

BQL = Below Quantitation Limit
*MS% Recovery for the multi-response pesticides is calculated as the av recovery of the single-response compounds (as per communication with t EPA Office of Solid Waste, Washington, D.C.)

FORM TPMSD Rev. 030293

Industrial & Environmental Analysts, Inc. (IEA)
TCLP HERBICIDES REGULATED
METHOD 8150

| | | | |
|---|---|---|---|
| IEA Project Number: | 979-028 | | |
| IEA Sample Number: | 9604259 | Date Received: | N/A |
| Client Name: | Federal Paperboard Co. | Date Sampled: | N/A |
| Client Project I.D.: | Waste Stream Characteristics | Date Extracted: | 04/22/96 |
| Sample Identification: | QC Blank (HB672) | Date Analyzed: | 05/03/96 |
| Matrix: | Water | Analysis By: | Eurillo |
| TCLP Extraction Date: | N/A | Dilution Factor: | 1.0 |

| Number | Compound | N.C. Regulatory Level (mg/L) | Quantitation Limit (mg/L) | Results Concentration (mg/L) |
|---|---|---|---|---|
| 1 | 2,4-D | 1.00 | 0.010 | BQL |
| 2 | 2,4,5-TP | 0.10 | 0.0020 | BQL |

Comments:
Sample specific quantitation limits may be calculated by multiplying the quantitation limit by the dilution factor.
BQL = Below Quantitation Limit
N/A = Not Applicable
Corresponding Samples: TCLP556, TCLP564, 9604259-01, -02, -04, -05, -01SPK 9604260-06, 9604259-03, 03SPK

FORM N.C. THERBR Rev. 030293

Industrial & Environmental Analysts, Inc. (IEA)
TCLP HERBICIDES REGULATED
METHOD 8150

| | | | |
|---|---|---|---|
| IEA Project Number: | 979-028 | | |
| IEA Sample Number: | 9604259 | Date Received: | N/A |
| Client Name: | Federal Paperboard Co. | Date Sampled: | N/A |
| Client Project I.D.: | Waste Stream Characteristics | Date Extracted: | 04/22/96 |
| Sample Identification: | Method Blank (TCLP556) | Date Analyzed: | 05/03/96 |
| Matrix: | Leachate | Analysis By: | Eurillo |
| TCLP Extraction Date: | 04/17/96 | Dilution Factor: | 1.0 |

| Number | Compound | N.C. Regulatory Level (mg/L) | Quantitation Limit (mg/L) | Results Concentration (mg/L) |
|---|---|---|---|---|
| 1 | 2,4-D | 1.00 | 0.010 | BQL |
| 2 | 2,4,5-TP | 0.10 | 0.0020 | BQL |

Comments:
Sample specific quantitation limits may be calculated by multiplying the quantitation limit by the dilution factor.
BQL = Below Quantitation Limit
N/A = Not Applicable
Corresponding Samples: 9604259-01, -02, -04, -05, 9604260-06

FORM N.C. THERBR Rev. 030293

Industrial & Environmental Analysts, Inc. (IEA)
TCLP HERBICIDES REGULATED
METHOD 8150

| | | | |
|---|---|---|---|
| IEA Project Number: | 979-028 | | |
| IEA Sample Number: | 9604259 | Date Received: | N/A |
| Client Name: | Federal Paperboard Co. | Date Sampled: | N/A |
| Client Project I.D.: | Waste Stream Characteristics | Date Extracted: | 04/22/96 |
| Sample Identification: | Method Blank (TCLP564) | Date Analyzed: | 05/03/96 |
| Matrix: | Leachate | Analysis By: | Eurillo |
| TCLP Extraction Date: | 04/19/96 | Dilution Factor: | 1.0 |

| Number | Compound | N.C. Regulatory Level (mg/L) | Quantitation Limit (mg/L) | Results Concentration (mg/L) |
|---|---|---|---|---|
| 1 | 2,4-D | 1.00 | 0.010 | BQL |
| 2 | 2,4,5-TP | 0.10 | 0.0020 | BQL |

Comments:
Sample specific quantitation limits may be calculated by multiplying the quantitation limit by the dilution factor.
BQL = Below Quantitation Limit
N/A = Not Applicable
Corresponding Sample: 9604259-03

FORM N.C. THERBR Rev. 030293

Industrial & Environmental Analysts, Inc. (IEA)
TCLP HERBICIDE MATRIX SPIKE

IEA Project ID: 979-028
IEA Sample ID: 9604259-01
Date Extracted: 04/22/96
Date Analyzed: 05/03/96

| COMPOUND | QUANTITATION LIMIT (mg/L) | SAMPLE CONCENTRATION (mg/L) | MS % REC # |
|---|---|---|---|
| 2,4-D | 0.010 | BQL | 80 |
| 2,4,5-TP | 0.0020 | BQL | 77 |

Comments:
BQL = Below Quantitation Limit

FORM THMSD Rev. 030293

Industrial & Environmental Analysts, Inc. (IEA)
TCLP HERBICIDE MATRIX SPIKE

IEA Project ID: 979-028
IEA Sample ID: 9604259-03
Date Extracted: 04/22/96
Date Analyzed: 05/03/96

| COMPOUND | QUANTITATION LIMIT (mg/L) | SAMPLE CONCENTRATION (mg/L) | MS % REC # |
|---|---|---|---|
| 2,4-D | 0.010 | BQL | 80 |
| 2,4,5-TP | 0.0020 | BQL | 86 |

Comments:
BQL = Below Quantitation Limit

FORM THMSD Rev. 030293

# CHAIN OF CUSTODY RECORD

IEA
An Aquarion Company
3000 WESTON PKWY.
CARY, N.C. 27513
PH # 919-677-0090
FAX # 919-677-0427

NO. 66991

**REGULATORY CLASSIFICATION - PLEASE SPECIFY**

☐ NPDES ☐ DRINKING WATER ☐ RCRA ☒ OTHER _____

Page 1 of 1

COMPANY: INTERNATIONAL PAPER

PROJECT #:

PROJECT NAME: WASTE STREAM CHARACTERIZATION

SAMPLERS: (SIGNATURE) T. Patrick Wy[illegible] IV

| SAMPLE I.D. | DATE | TIME | COMP | GRAB | STATION LOCATION | # OF CONTAINERS | MATRIX SOIL | MATRIX WATER | REQUESTED PARAMETERS: FULL TCLP |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 4/8 | | | X | DREGS | | X | | X |
| 2 | 4/8 | | | X | GRITS | | X | | X |
| 3 | 4/8 | | | X | SLUDGE | | | X | X |
| 4 | 4/8 | | | X | OLD LIME MUD POND | | X | | X |
| 5 | 4/8 | | | X | NEW LIME MUD POND | | X | | X |
| 6 | 4/8 | | | X | POWER BOILER ASH | | X | | X |

| RELINQUISHED BY (SIGNATURE) | DATE | TIME | RECEIVED BY | DATE | TIME |
|---|---|---|---|---|---|
| T.P. Wy[illegible] IV | 4/9/90 | | | | |

| RELINQUISHED BY (SIGNATURE) | DATE | TIME | RECEIVED FOR LAB BY | DATE | TIME |
|---|---|---|---|---|---|
| | | | S. Pa[illegible] | 4/10/90 | 0930 |

| IEA QUOTE NO. | IEA RUSH NO. |
|---|---|
| | |
| **PROJECT MANAGER (PLEASE PRINT)** | **P.O. NO.** |
| | |

**REMARKS ON SAMPLE RECEIPT**

☒ BOTTLE INTACT ☐ CUSTODY SEALS
☐ PRESERVED ☐ SEALS INTACT

**IEA REMARKS**

4°C 979-C2Y

**FIELD REMARKS**

# CHAIN OF CUSTODY RECORD

IEA
An Aquarion Company
3000 WESTON PKWY.
CARY, N.C. 27513
PH # 919-677-0090
FAX # 919-677-0427

NO. 66991

**REGULATORY CLASSIFICATION - PLEASE SPECIFY**

☐ NPDES ☐ DRINKING WATER ☐ RCRA ☒ OTHER _____

Page 1 of 1

COMPANY: INTERNATIONAL PAPER

PROJECT #:

PROJECT NAME: WASTE STREAM CHARACTERIZATION

SAMPLERS (SIGNATURE): T. Pahl Wy

| SAMPLE ID | DATE | TIME | COMP | GRAB | STATION LOCATION | # OF CONTAINERS | MATRIX SOIL | MATRIX WATER | FULL TCLP |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 4/8 | | | X | DREGS | | X | | X |
| 2 | 4/8 | | | X | GRITS | | X | | X |
| 3 | 4/8 | | | X | SLUDGE | | | X | X |
| 4 | 4/8 | | | X | OLD LIME MUD POND | | X | | X |
| 5 | 4/8 | | | X | NEW LIME MUD POND | | X | | X |
| 6 | 4/8 | | | X | POWER BOILER ASH | | X | | X |

REQUESTED PARAMETERS

| RELINQUISHED BY (SIGNATURE) | DATE | TIME | RECEIVED BY | DATE | TIME |
|---|---|---|---|---|---|
| T. Pahl Wy | 4/9/90 | | | | |

| RELINQUISHED BY (SIGNATURE) | DATE | TIME | RECEIVED FOR LAB BY | DATE | TIME |
|---|---|---|---|---|---|
| | | | S. Pagnard | 4/10/90 | 0930 |

| IEA QUOTE NO. | IEA RUSH NO. |
|---|---|
| | |
| **PROJECT MANAGER (PLEASE PRINT)** | **P.O. NO.** |
| | |

**REMARKS ON SAMPLE RECEIPT**

☒ BOTTLE INTACT ☐ CUSTODY SEALS
☐ PRESERVED ☐ SEALS INTACT
☒ CHILLED ☐ SEE REMARKS

**IEA REMARKS**

4°C 979-C

**FIELD REMARKS**

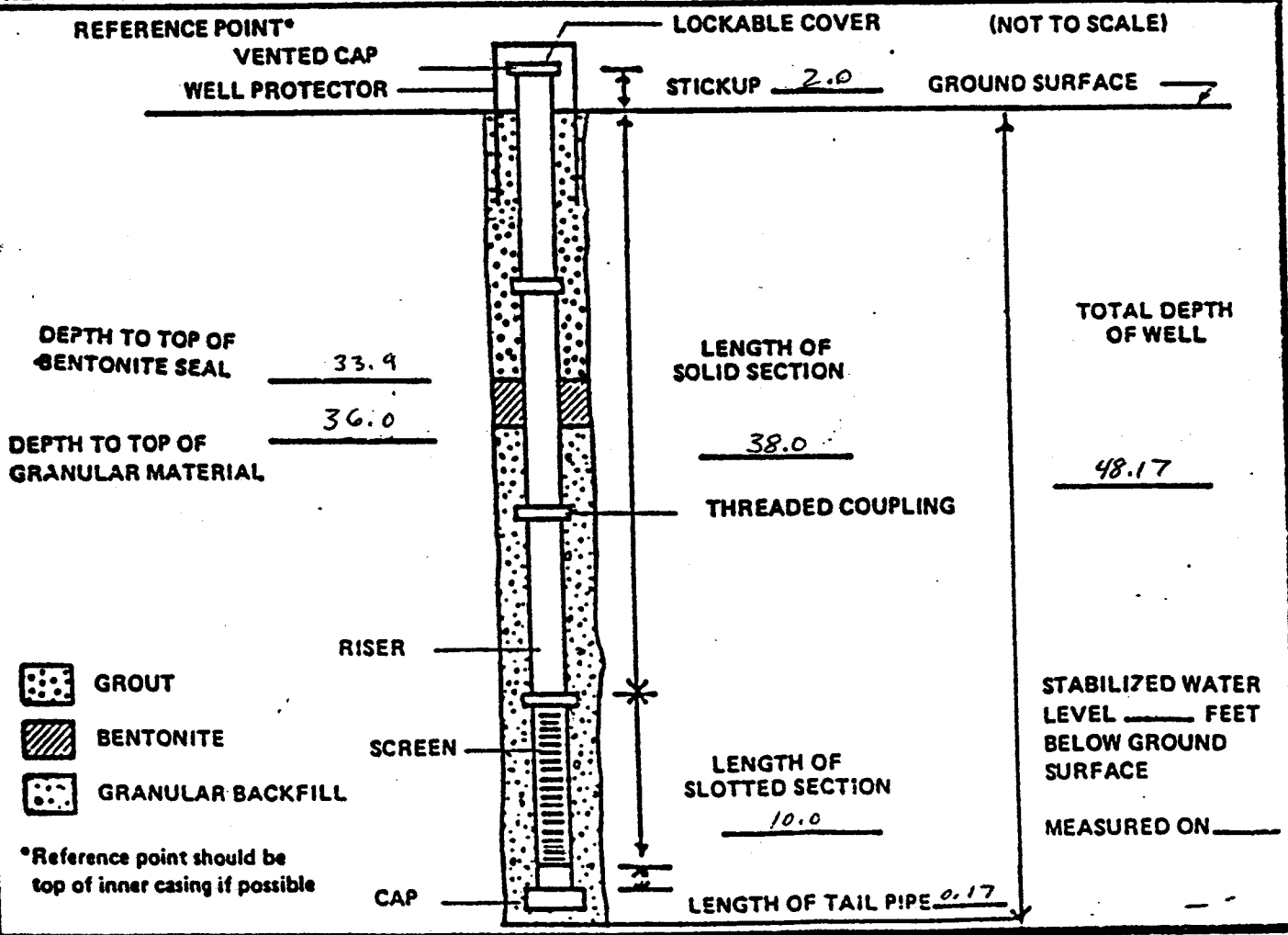
# Appendix - B

# APPENDIX B

# lANDFILL MONITORING WELL CONSTRUCTION RECORDS

# TYPE II MONITORING WELL INSTALLATION RECORD

JOB NAME: FEDERAL PAPER BOARD
JOB NUMBER: 59-7516
ELL NUMBER: MW 1-B
INSTALLATION DATE: 3/17/88
LOCATION:
GROUND SURFACE ELEVATION:
REFERENCE POINT ELEVATION:
GRANULAR BACKFILL MATERIAL: MEDIUM SAND
SLOT SIZE: .010"
SCREEN MATERIAL: PVC
SCREEN DIAMETER: 2"
RISER MATERIAL: PVC
RISER DIAMETER: 2"
DRILLING TECHNIQUE: H.S.A.
DRILLING CONTRACTOR: CAROLINA DRILLING
BOREHOLE DIAMETER: 10½" to 40, 4" to 49
LAW ENGINEERING FIELD REPRESENTATIVE: BELLIS
LOCK BRAND: MASTER
SIZE/MODEL:
KEY CODE/COMBINATION: 0536



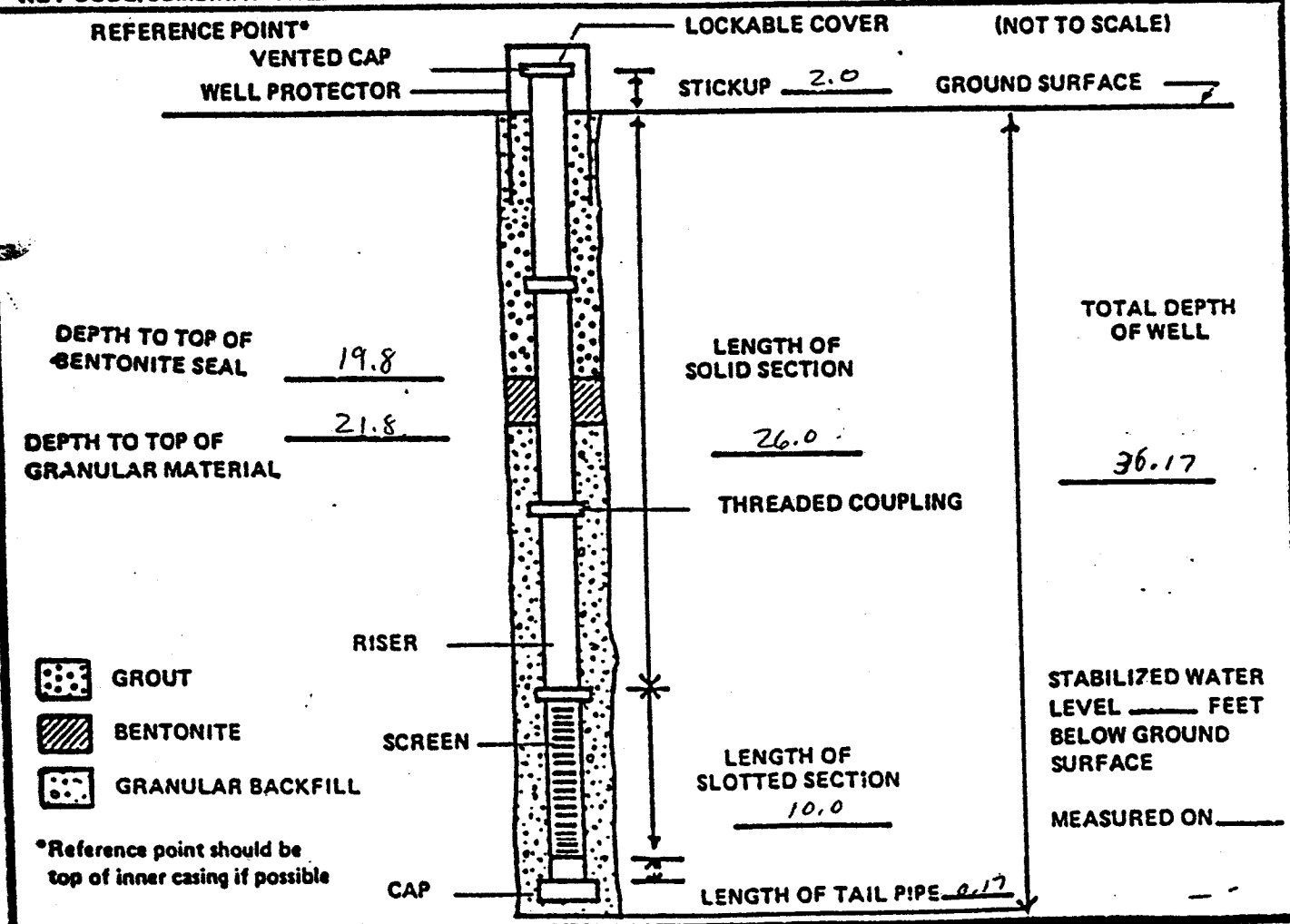

LAW ENVIRONMENTAL, INC.

TYPE II MONITORING WELL INSTALLATION RECORD

FIGURE

# TYPE II MONITORING WELL INSTALLATION RECORD

JOB NAME: FEDERAL PAPER BOARD
JOB NUMBER: 59-7516
WELL NUMBER: MW 2-B
INSTALLATION DATE: 3/23/88
LOCATION:
GROUND SURFACE ELEVATION:
REFERENCE POINT ELEVATION:
GRANULAR BACKFILL MATERIAL: MEDIUM SAND
SLOT SIZE: .010"
SCREEN MATERIAL: PVC
SCREEN DIAMETER: 2"
RISER MATERIAL: PVC
RISER DIAMETER: 2"
DRILLING TECHNIQUE: H.S.A.
DRILLING CONTRACTOR: CAROLINA DRILLING
BOREHOLE DIAMETER: 10½" to 25', 4" to 36'
LAW ENGINEERING FIELD REPRESENTATIVE: REED
LOCK BRAND:
SIZE/MODEL:
KEY CODE/COMBINATION:



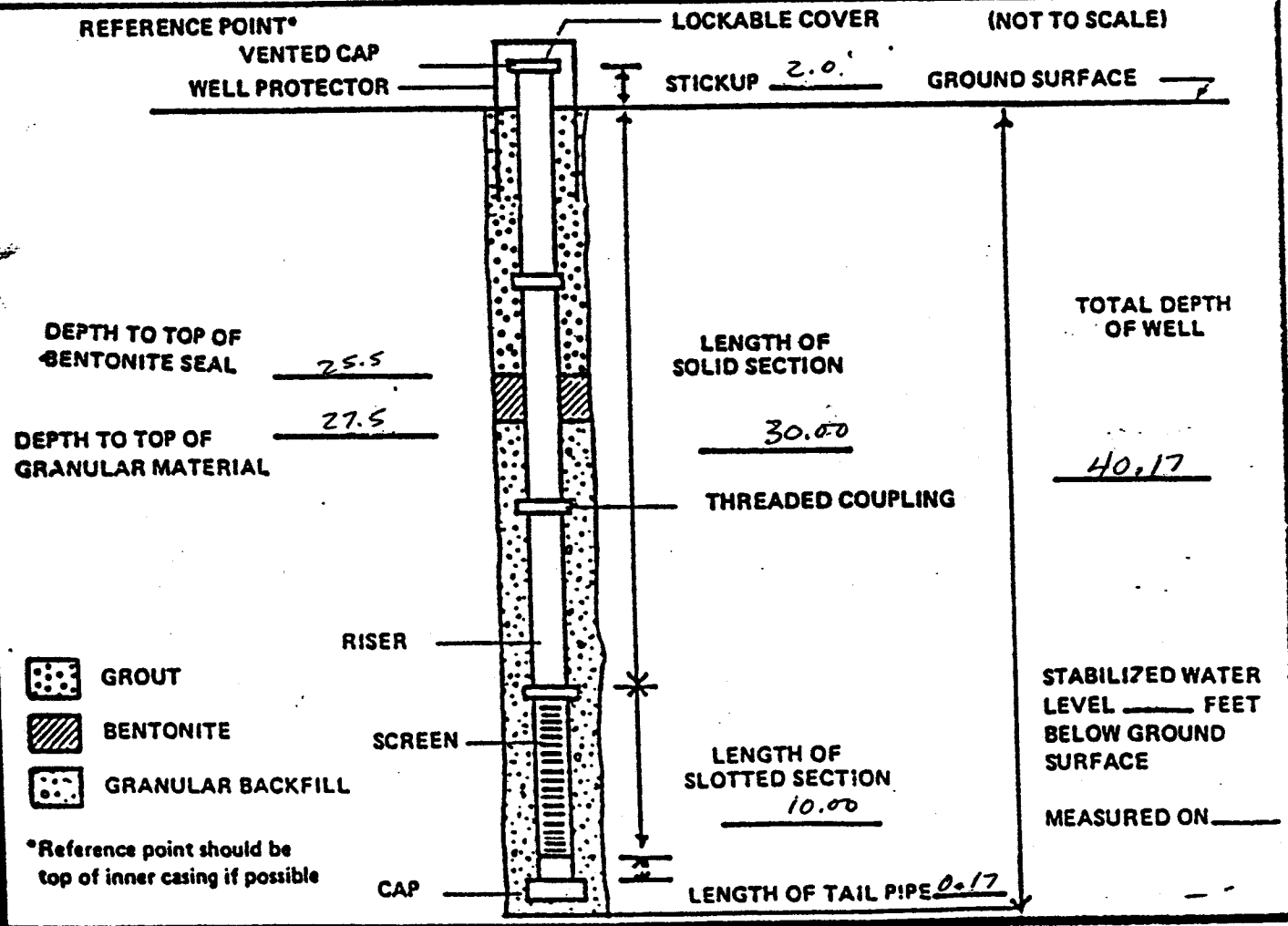

LAW ENVIRONMENTAL, INC.

TYPE II MONITORING WELL INSTALLATION RECORD

FIGURE

# TYPE II MONITORING WELL INSTALLATION RECORD

JOB NAME: FEDERAL PAPER BOARD
JOB NUMBER: 59-7516
.LL NUMBER: MW 3-B
INSTALLATION DATE: 3-21-83
LOCATION: ON DIKE
GROUND SURFACE ELEVATION:
REFERENCE POINT ELEVATION:
GRANULAR BACKFILL MATERIAL: MEDIUM SAND
SLOT SIZE: .010
SCREEN MATERIAL: PVC
SCREEN DIAMETER: 2"
RISER MATERIAL: PVC
RISER DIAMETER: 2"
DRILLING TECHNIQUE: H.S.A.
DRILLING CONTRACTOR: CAROLINA DRILLING
BOREHOLE DIAMETER: 10.5"
LAW ENGINEERING FIELD REPRESENTATIVE: B. REED
LOCK BRAND:
SIZE/MODEL:
KEY CODE/COMBINATION:



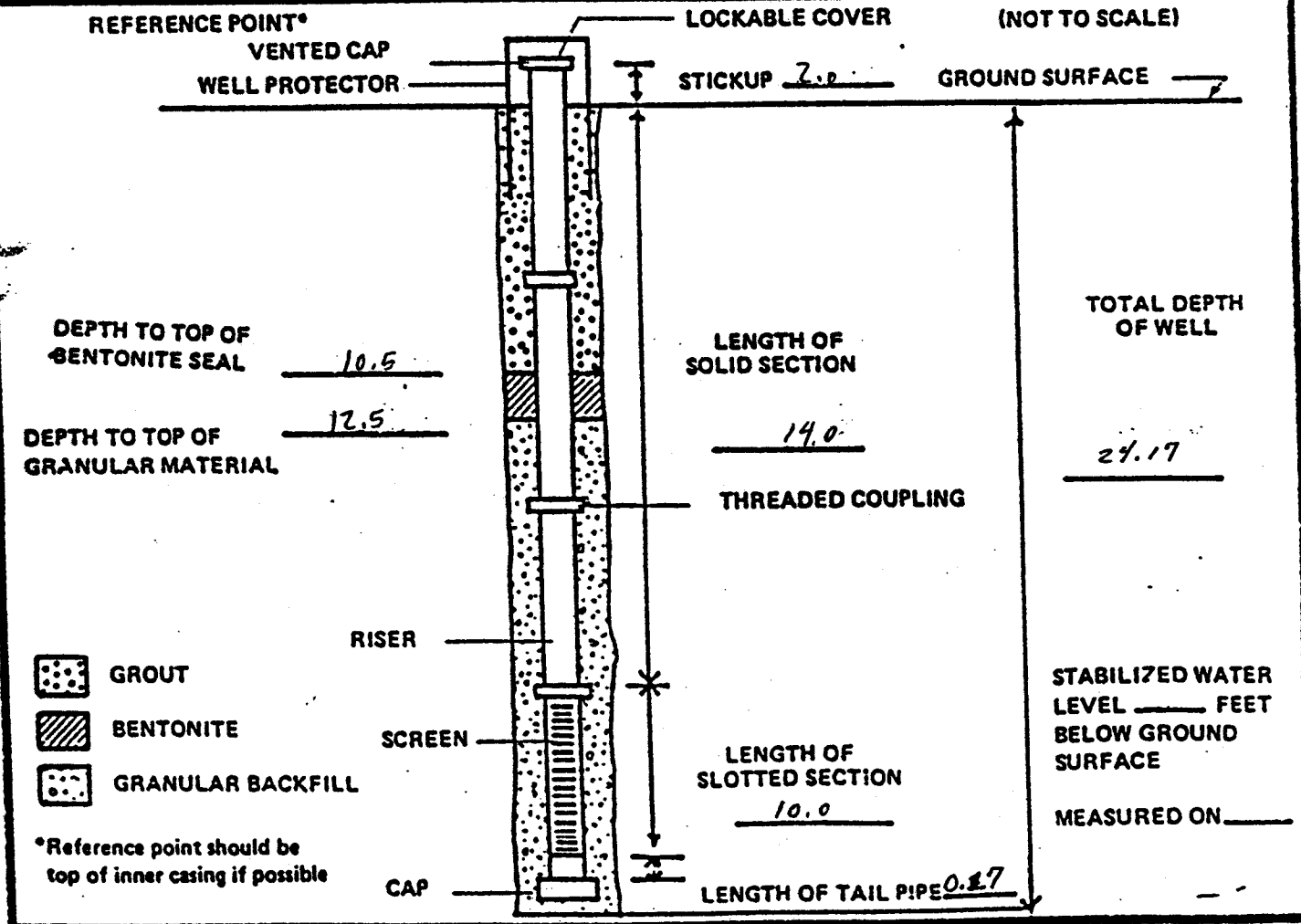

LAW ENVIRONMENTAL, INC.

TYPE II MONITORING WELL INSTALLATION RECORD

FIGURE

# TYPE II MONITORING WELL INSTALLATION RECORD

JOB NAME: Federal Paper Board
JOB NUMBER: 59-7516
LL NUMBER: MW 4-B
INSTALLATION DATE: 3-18-88
LOCATION:
GROUND SURFACE ELEVATION:
REFERENCE POINT ELEVATION:
GRANULAR BACKFILL MATERIAL: MEDIUM SAND
SLOT SIZE: .010
SCREEN MATERIAL: PVC
SCREEN DIAMETER: 2"
RISER MATERIAL: PVC
RISER DIAMETER: 2"
DRILLING TECHNIQUE: H.S.A.
DRILLING CONTRACTOR: Carolina Drilling
BOREHOLE DIAMETER: 10 1/2" to 15', 4" to 25'
LAW ENGINEERING FIELD REPRESENTATIVE: B. Reed
LOCK BRAND:
SIZE/MODEL:
KEY CODE/COMBINATION:



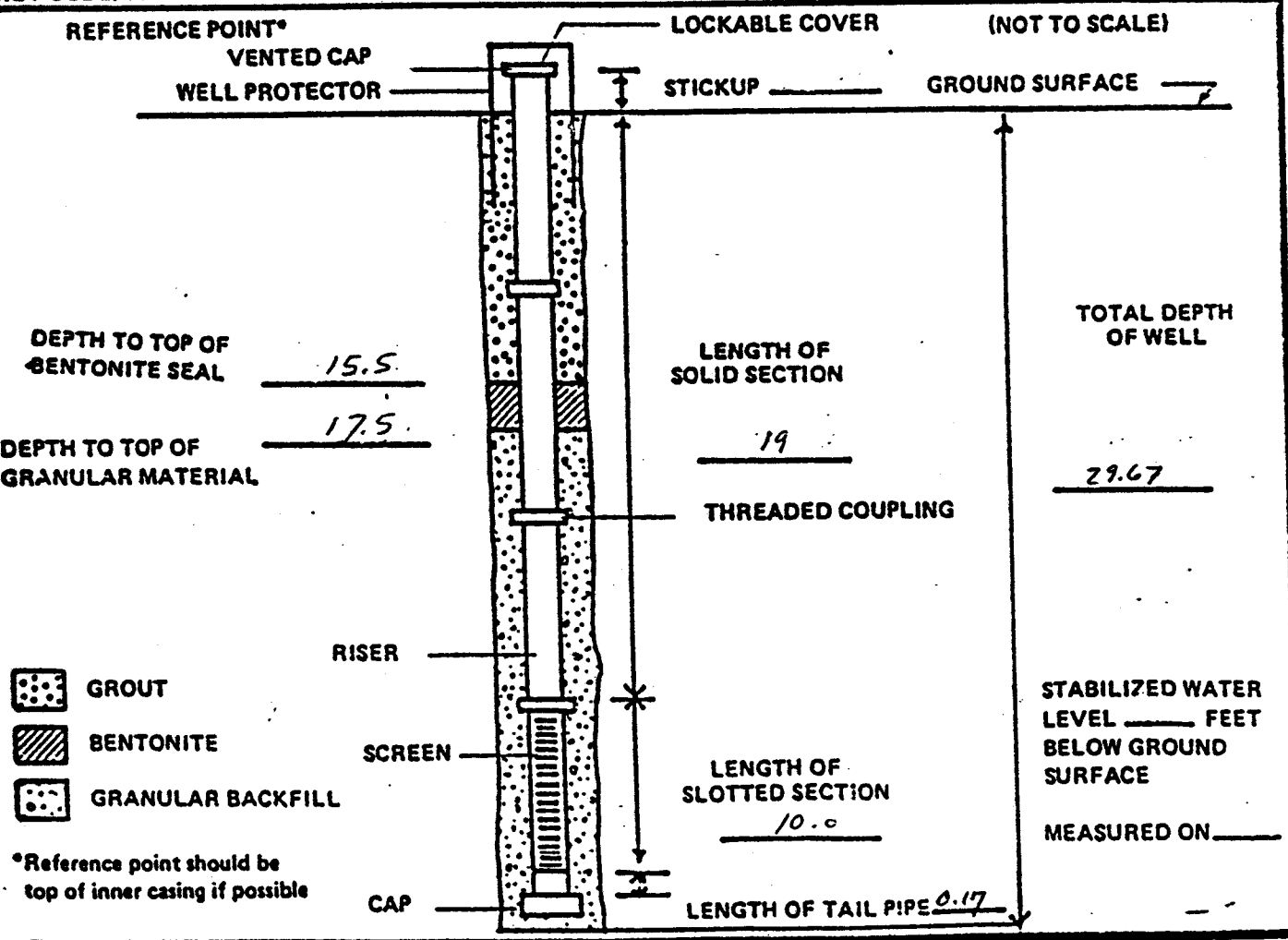

LAW ENVIRONMENTAL, INC.

TYPE II MONITORING WELL INSTALLATION RECORD

FIGURE

# TYPE II MONITORING WELL INSTALLATION RECORD

JOB NAME: FEDERAL PAPER BOARD
JOB NUMBER: 59-7516
WELL NUMBER: MW 5-B
INSTALLATION DATE: 3-21-88
LOCATION:
GROUND SURFACE ELEVATION:
REFERENCE POINT ELEVATION:
GRANULAR BACKFILL MATERIAL: MEDIUM SAND
SLOT SIZE: .010
SCREEN MATERIAL: PVC
SCREEN DIAMETER: 2"
RISER MATERIAL: PVC
RISER DIAMETER: 2"
DRILLING TECHNIQUE: H.S.A.
DRILLING CONTRACTOR: CAROLINA DRILLING
BOREHOLE DIAMETER: 10 ½" to 25', 9" to 30'
LAW ENGINEERING FIELD REPRESENTATIVE: B. REED
LOCK BRAND:
SIZE/MODEL:
KEY CODE/COMBINATION:



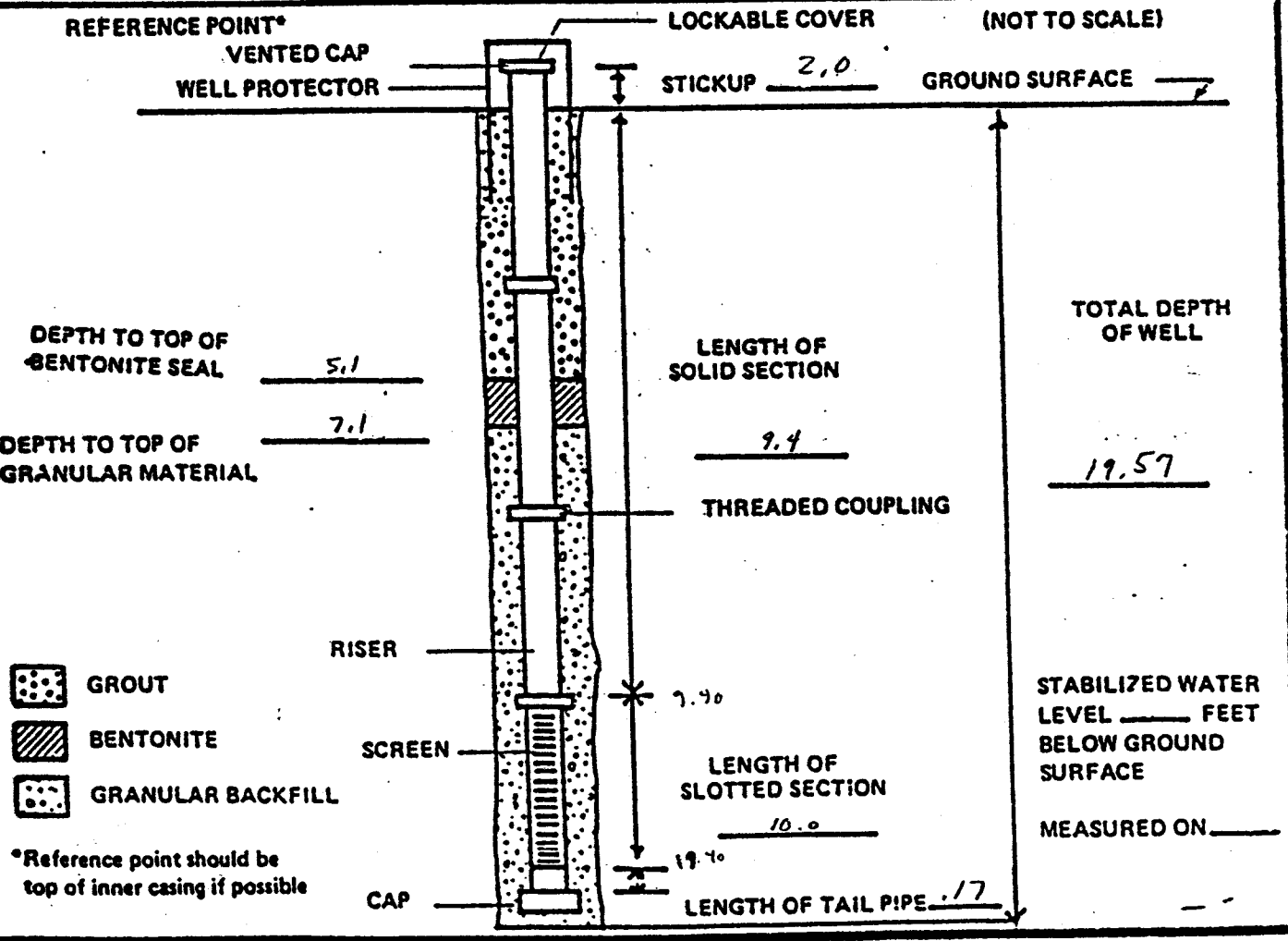

LAW ENVIRONMENTAL, INC.

TYPE II MONITORING WELL INSTALLATION RECORD

FIGURE

# TYPE II MONITORING WELL INSTALLATION RECORD

JOB NAME: FEDERAL PAPER BOARD
JOB NUMBER: 59-7516
WELL NUMBER: MW 6-A
INSTALLATION DATE: 3/24/88
LOCATION: Between fence and railroad line A
GROUND SURFACE ELEVATION:
REFERENCE POINT ELEVATION:
GRANULAR BACKFILL MATERIAL: medium SAND
SLOT SIZE: .010
SCREEN MATERIAL: PVC
SCREEN DIAMETER: 2"
RISER MATERIAL: PVC
RISER DIAMETER: 2"
DRILLING TECHNIQUE: H.S.A.
DRILLING CONTRACTOR: CAROLINA DRILLING
BOREHOLE DIAMETER: 10 1/4" to 15', 4" to 21.5'
LAW ENGINEERING FIELD REPRESENTATIVE: REED
LOCK BRAND:
SIZE/MODEL:
KEY CODE/COMBINATION:



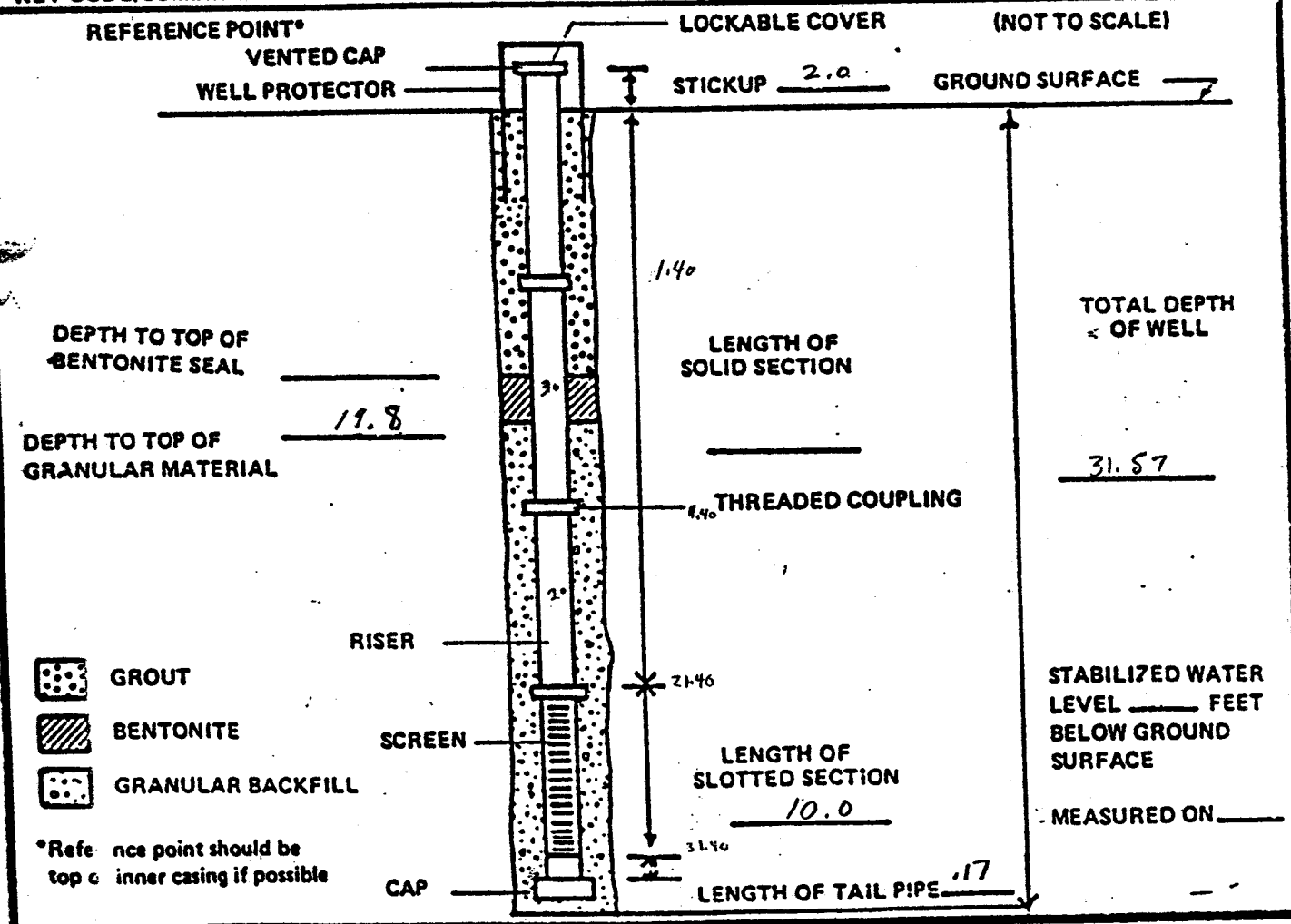

LAW ENVIRONMENTAL, INC.

TYPE II MONITORING WELL INSTALLATION RECORD

FIGURE

# TYPE II MONITORING WELL INSTALLATION RECORD

JOB NAME: FEDERAL PAPER BOARD
JOB NUMBER: 59-7516
LL NUMBER: MW 6-B
INSTALLATION DATE: 3/24/88
LOCATION: Between fence and railroad line A
GROUND SURFACE ELEVATION:
REFERENCE POINT ELEVATION:
GRANULAR BACKFILL MATERIAL: medium SAND
SLOT SIZE: .010
SCREEN MATERIAL: PVC
SCREEN DIAMETER: 2"
RISER MATERIAL: PVC
RISER DIAMETER: 2"
DRILLING TECHNIQUE: H.S.A.
DRILLING CONTRACTOR: CAROLINA DRILLING
BOREHOLE DIAMETER: 4" to 31.5' / 10 1/4" to 30'
LAW ENGINEERING FIELD REPRESENTATIVE: REED
LOCK BRAND: MASTER
SIZE/MODEL: No. 3
KEY CODE/COMBINATION: 3945



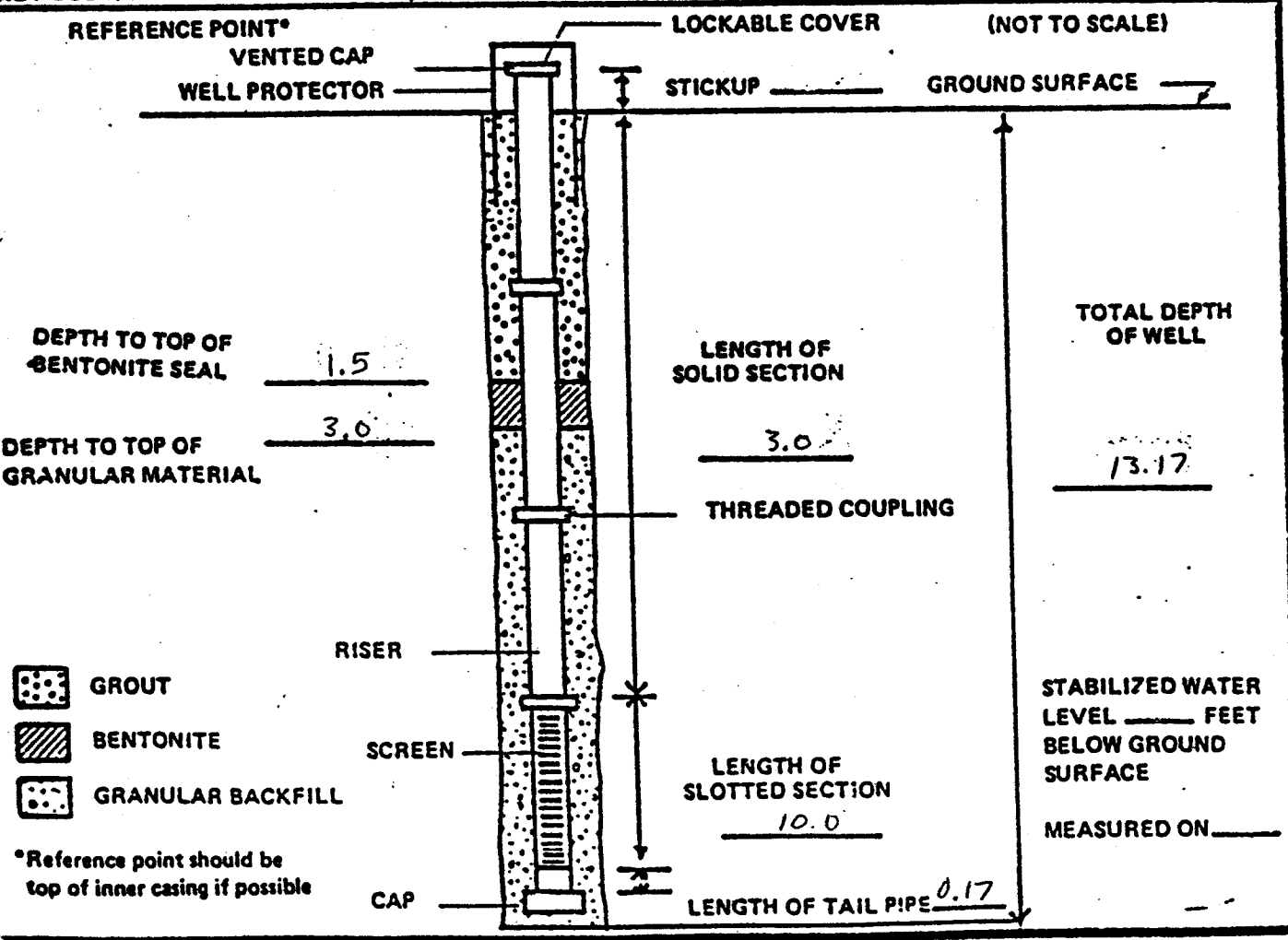

LAW ENVIRONMENTAL, INC.

TYPE II MONITORING WELL INSTALLATION RECORD

FIGURE

# TYPE II MONITORING WELL INSTALLATION RECORD

JOB NAME: Federal Paper Board
JOB NUMBER: 59-7516
WELL NUMBER: MW 7-A
INSTALLATION DATE: 4-1-88
LOCATION:
GROUND SURFACE ELEVATION:
REFERENCE POINT ELEVATION:
GRANULAR BACKFILL MATERIAL: Fine to Medium Sand
SLOT SIZE: .010
SCREEN MATERIAL: PVC
SCREEN DIAMETER: 2"
RISER MATERIAL: PVC
RISER DIAMETER: 2"
DRILLING TECHNIQUE: H.S.A.
DRILLING CONTRACTOR: Carolina Drilling
BOREHOLE DIAMETER: 10 1/4"
LAW ENGINEERING FIELD REPRESENTATIVE: Pruneau
LOCK BRAND: Master
SIZE/MODEL: No. 3
KEY CODE/COMBINATION: 3945



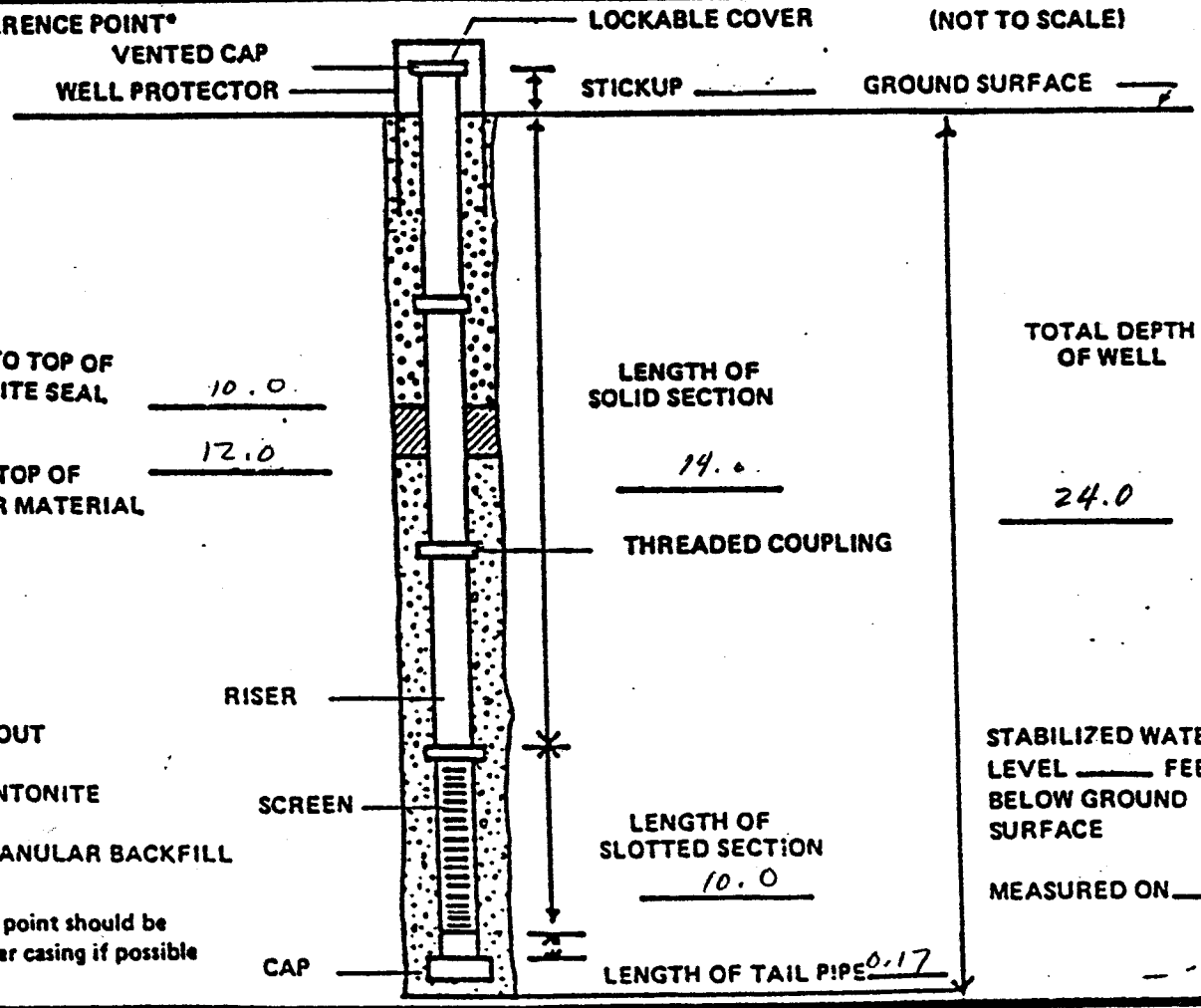

LAW ENVIRONMENTAL, INC.

TYPE II MONITORING WELL INSTALLATION RECORD

FIGURE

# TYPE II MONITORING WELL INSTALLATION RECORD

JOB NAME: FEDERAL PAPER BOARD
JOB NUMBER: 59-7516
WELL NUMBER: MW 7-B
INSTALLATION DATE: 4-1-88
LOCATION:
GROUND SURFACE ELEVATION:
REFERENCE POINT ELEVATION:
GRANULAR BACKFILL MATERIAL: FINE TO MEDIUM SAND
SLOT SIZE: .010
SCREEN MATERIAL: PVC
SCREEN DIAMETER: 2"
RISER MATERIAL: PVC
RISER DIAMETER: 2"
DRILLING TECHNIQUE: H.S.A.
DRILLING CONTRACTOR: CAROLINA DRILLING
BOREHOLE DIAMETER: 10¼"
LAW ENGINEERING FIELD REPRESENTATIVE: PRUNEAU
LOCK BRAND: MASTER
SIZE/MODEL: #3
KEY CODE/COMBINATION: 3945



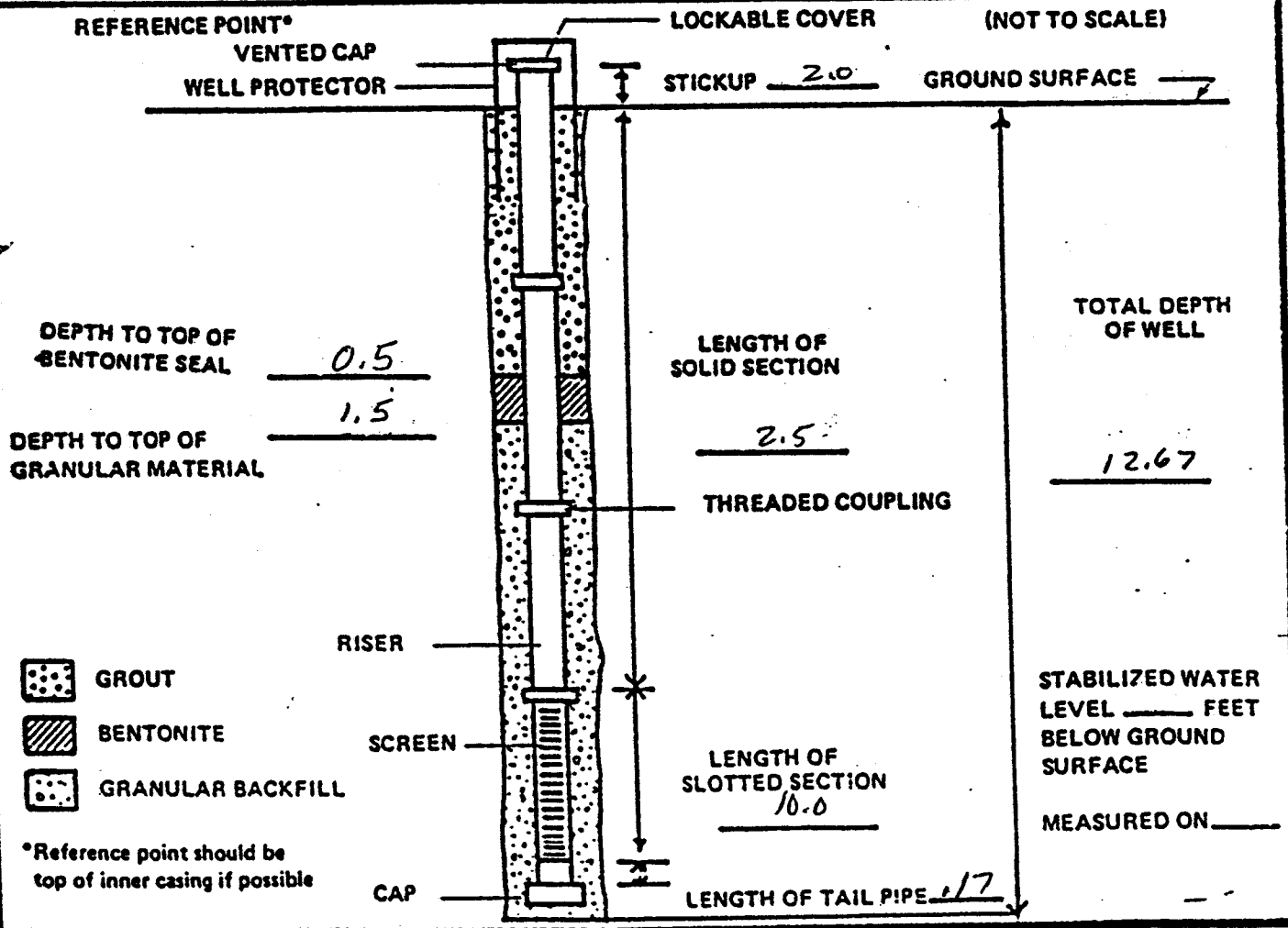

LAW ENVIRONMENTAL, INC.

TYPE II MONITORING WELL INSTALLATION RECORD

FIGURE

# TYPE II MONITORING WELL INSTALLATION RECORD

JOB NAME: FEDERAL PAPER BOARD
JOB NUMBER: 59-7516
WELL NUMBER: MW 8-A
INSTALLATION DATE: 3-25-88
LOCATION:
GROUND SURFACE ELEVATION:
REFERENCE POINT ELEVATION:
GRANULAR BACKFILL MATERIAL: MEDIUM SAND
SLOT SIZE: .010
SCREEN MATERIAL: PVC
SCREEN DIAMETER: 2"
RISER MATERIAL: PVC
RISER DIAMETER: 2"
DRILLING TECHNIQUE: H.S.A.
DRILLING CONTRACTOR: CAROLINA DRILLING
BOREHOLE DIAMETER: 10 ½"
LAW ENGINEERING FIELD REPRESENTATIVE: REED
LOCK BRAND: MASTER
SIZE/MODEL: #3
KEY CODE/COMBINATION: 3945



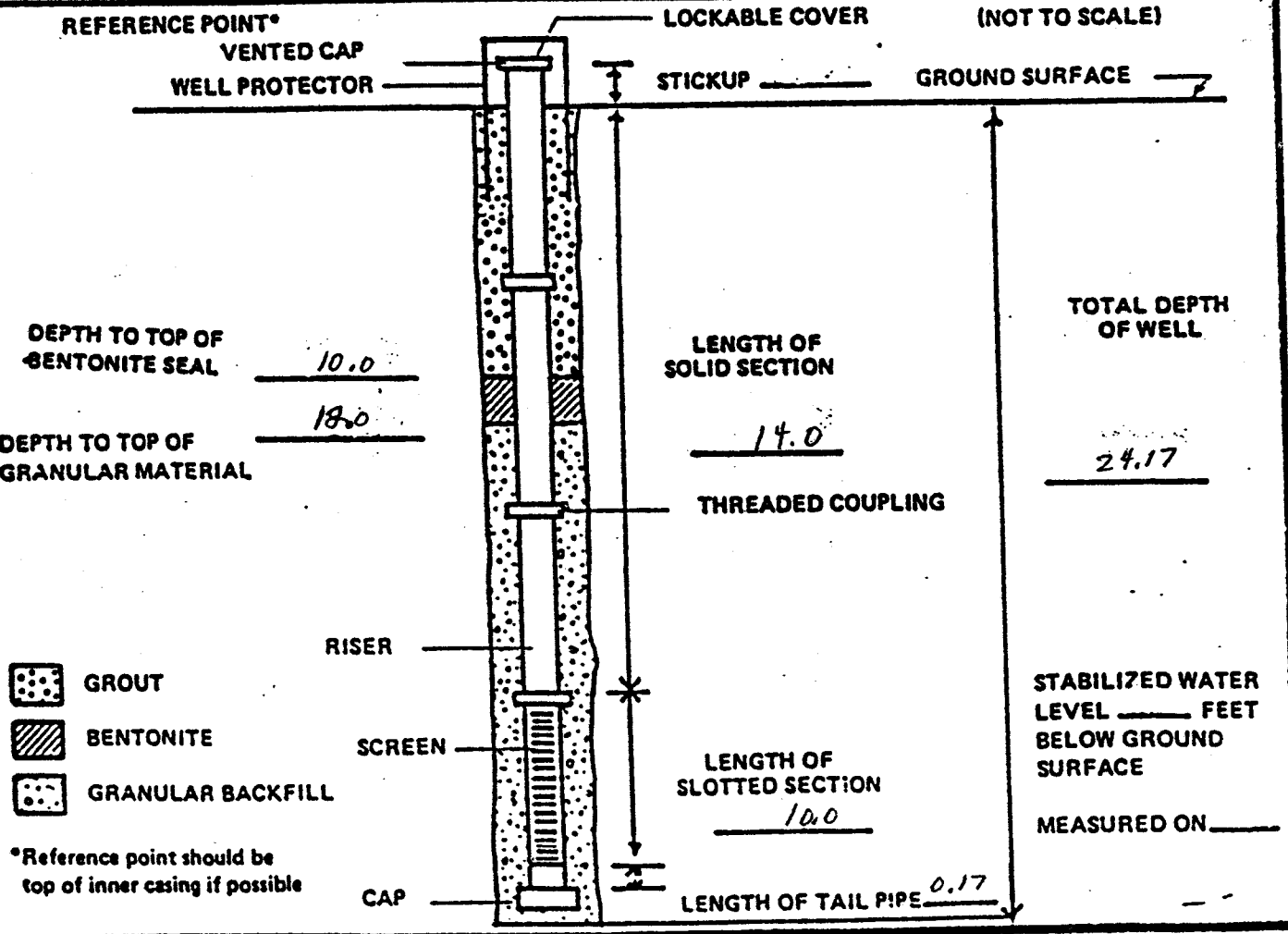

LAW ENVIRONMENTAL, INC.

TYPE II MONITORING WELL INSTALLATION RECORD

FIGURE

# TYPE II MONITORING WELL INSTALLATION RECORD

JOB NAME: Federal Paper Board
JOB NUMBER: 59-7516
WELL NUMBER: MW 8-B
INSTALLATION DATE: 4/1/88
LOCATION:
GROUND SURFACE ELEVATION:
REFERENCE POINT ELEVATION:
GRANULAR BACKFILL MATERIAL: Fine To Medium Sand
SLOT SIZE: .010
SCREEN MATERIAL: PVC
SCREEN DIAMETER: 2"
RISER MATERIAL: PVC
RISER DIAMETER: 2"
DRILLING TECHNIQUE: H.S.A.
DRILLING CONTRACTOR: Carolina Drilling
BOREHOLE DIAMETER: 10½"
LAW ENGINEERING FIELD REPRESENTATIVE: Pruneau
LOCK BRAND: MASTER
SIZE/MODEL: #3
KEY CODE/COMBINATION: 3945




LAW ENVIRONMENTAL, INC.

TYPE II MONITORING WELL INSTALLATION RECORD

FIGURE

DIVISION OF ENVIRONMENTAL MANAGEMENT - GROUNDWATER SECTION
P.O. BOX 27687 - RALEIGH, N.C. 27611, PHONE (919) 733-5083

FOR OFFICE USE ONLY
Quad. No. _____ Serial No. _____
Lat. _____ Long. _____ Pc _____
Minor Basin _____
Basin Code _____
Header Ent. _____ GW-1 Ent. _____

# WELL CONSTRUCTION RECORD

DRILLING CONTRACTOR: CAROLINA DRILLING
DRILLER REGISTRATION NUMBER: 728

STATE WELL CONSTRUCTION PERMIT NUMBER: 23-0036-Wm-0030

1. WELL LOCATION: (Show sketch of the location below)
Nearest Town: RIEGELWOOD
FEDERAL PAPER
(Road, Community, or Subdivision and Lot No.)
County: Columbus

2. OWNER: FEDERAL PAPER BOARD Co., INC
ADDRESS: (Street or Route No.)
RIEGELWOOD (City or Town) NC (State) 28456 (Zip Code)

3. DATE DRILLED: 4-28-86 USE OF WELL: MONITOR
TOTAL DEPTH: 28.6 CUTTINGS COLLECTED: ☒ Yes ☐ No
DOES WELL REPLACE EXISTING WELL? ☐ Yes ☒ No
STATIC WATER LEVEL: 15.54 FT. ☐ above ☒ below TOP OF CASING.
TOP OF CASING IS 2.30 FT. ABOVE LAND SURFACE.
YIELD (gpm): _____ METHOD OF TEST _____
WATER ZONES (depth): 13.24
CHLORINATION: Type — Amount —

4. CASING:

| | Depth From | To | Diameter | Wall Thickness or Weight/Ft. | Material |
|---|---|---|---|---|---|
| | 0 | 18.6 Ft. | 2" | SCH 40 | PVC |
| | | Ft. | | | |
| | | Ft. | | | |

5. GROUT:

| | Depth From | To | Material | Method |
|---|---|---|---|---|
| | 0 | 16 Ft. | NEAT | IN-PLACE |
| | | Ft. | | |

6. SCREEN:

| | Depth From | To | Diameter | Slot Size | Material |
|---|---|---|---|---|---|
| | 18.6 | 28.6 Ft. | 2 in. | .010 in. | PVC |
| | | Ft. | in. | in. | |
| | | Ft. | in. | in. | |

7. GRAVEL PACK:

| | Depth From | To | Size | Material |
|---|---|---|---|---|
| | 17.5 | 29 Ft. | MEDIUM | SAND |
| | | Ft. | | |

8. REMARKS:

| Depth From | To | DRILLING LOG Formation Description |
|---|---|---|
| | | ATTACHED |

If additional space is needed use back of form.

LOCATION SKETCH
(Show direction and distance from at least two State Roads, or other map reference points)

ATTACHED

I DO HEREBY CERTIFY THAT THIS WELL WAS CONSTRUCTED IN ACCORDANCE WITH 15 NCAC 2C, WELL CONSTRUCTION STANDARDS, AND THAT A COPY OF THIS RECORD HAS BEEN PROVIDED TO THE WELL OWNER.

SIGNATURE OF CONTRACTOR OR AGENT: [signature] DATE: 5-10-86

GW-1 Revised 11/84

CAROLINA DRILLING
246 Two Chopt Road
Wilmington, N.C. 28405
(919) 799-0493

CD PROJECT FEDERAL PAPER - RIEGELWOOD, N.C.
CD PROJECT # 86-333 BORING # B1 DATE 4-28-86
CLIENT PROJECT # 23-0036-WM-0030 SURFACE ELEVATION (+)44.6 MSL
DRILLER G. BRIDGER CREW R. FOWLER

| DEPTH FROM | DEPTH TO | SOIL STRATA / SOIL DESCRIPTION AND REMARKS | USCS | NO. | DEPTH FROM | DEPTH TO | FIRST 6" | 2ND 6" | 3RD 6" | REC. |
|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 14 | MEDIUM STIFF TAN AND ORANGE CLAY - TRACE OF SAND, MOIST | ML | 1 | 3.5 | 5 | 2 | 3 | 6 | |
| | | | ML | 2 | 8.5 | 10 | 2 | 3 | 6 | |
| 14 | 25 | LOOSE TO FIRM GRAY AND TAN FINE TO MEDIUM SAND, WET | ML/SP | 3 | 13.5 | 15 | 4 | 10 | 14 | |
| | | | SP | 4 | 18.5 | 20 | 3 | 5 | 6 | |
| | | | SP | 5 | 23.5 | 25 | 4 | 5 | 5 | |

NON-DRILLING TIME (Hrs.) _____ REMARKS: CLEAR, 70'S
...NG LAYOUT _____ MOVING _____
LEARING _____ STANDBY _____
WATER LEVEL: @ _____ DATE _____ TIME _____
@ _____ DATE _____ TIME _____
CAVE-IN DEPTH: @ DATE TIME

DEPARTMENT OF NATURAL RESOURCES AND COMMUNITY DEVELOPMENT
DIVISION OF ENVIRONMENTAL MANAGEMENT - GROUNDWATER SECTION
P.O. BOX 27687 - RALEIGH, N.C. 27611, PHONE (919) 733-5083

FOR OFFICE USE ONLY
Quad. No. _____ Serial No. _____
Lat. _____ Long. _____ Pc _____
Minor Basin _____
Basin Code _____
Header Ent. _____ GW-1 Ent. _____

# WELL CONSTRUCTION RECORD

DRILLING CONTRACTOR: CAROLINA DRILLING
DRILLER REGISTRATION NUMBER: 728

STATE WELL CONSTRUCTION PERMIT NUMBER: 23-0036-COM-0030

WELL LOCATION: (Show sketch of the location below)
Nearest Town: RIEGELWOOD
FEDERAL PAPER
(Road, Community, or Subdivision and Lot No.)
County: COLUMBUS

OWNER: FEDERAL PAPER BOARD CO., INC.
ADDRESS: (Street or Route No.)
RIEGELWOOD (City or Town) NC (State) 28456 (Zip Code)

DATE DRILLED: 4-29-86 USE OF WELL: MONITOR
TOTAL DEPTH: 23.70 ~~CUTTINGS~~ SPTS COLLECTED: ☒ Yes ☐ No
DOES WELL REPLACE EXISTING WELL? ☐ Yes ☒ No
STATIC WATER LEVEL: 13.87 FT. ☐ above ☒ below TOP OF CASING.
TOP OF CASING IS 1.70 FT. ABOVE LAND SURFACE.
YIELD (gpm): — METHOD OF TEST —
WATER ZONES (depth): 12.17'

CHLORINATION: Type — Amount —

CASING:

| | Depth From | Depth To | Diameter | Wall Thickness or Weight/Ft. | Material |
|---|---|---|---|---|---|
| | 0 | 8.7 | 2" | SCH40 | PVC |
| | | | | | |
| | | | | | |

GROUT:

| | Depth From | Depth To | Material | Method |
|---|---|---|---|---|
| | 0 | 6 | NEAT | IN-PLACE |
| | | | | |

SCREEN:

| | Depth From | Depth To | Diameter | Slot Size | Material |
|---|---|---|---|---|---|
| | 8.7 | 23.7 | 2 in. | .010 in. | PVC |
| | | | in. | in. | |
| | | | in. | in. | |

GRAVEL PACK:

| | Depth From | Depth To | Size | Material |
|---|---|---|---|---|
| | 7.5 | 24 | MEDIUM | SAND |
| | | | | |

REMARKS:

| Depth From | Depth To | DRILLING LOG Formation Description |
|---|---|---|
| | | ATTACHED |

If additional space is needed use back of form.

LOCATION SKETCH
(Show direction and distance from at least two State Roads, or other map reference points)

ATTACHED

I DO HEREBY CERTIFY THAT THIS WELL WAS CONSTRUCTED IN ACCORDANCE WITH 15 NCAC 2C, WELL CONSTRUCTION STANDARDS, AND THAT A COPY OF THIS RECORD HAS BEEN PROVIDED TO THE WELL OWNER.

[illegible] 5-9-86
SIGNATURE OF CONTRACTOR OR AGENT DATE

CAROLINA DRILLING
246 Two Chopt Road
Wilmington, N.C. 28405
(919) 799-0493

CD PROJECT FEDERAL PAPER - RIEGELWOOD, NC
CD PROJECT # 86-333 BORING # B2 DATE 4-29-86
CLIENT PROJECT # 23-0036 WM-0030 SURFACE ELEVATION (+) 51.5 MSL
DRILLER G. BRIDGER CREW R. FOWLER

| DEPTH FROM | DEPTH TO | SOIL STRATA / SOIL DESCRIPTION AND REMARKS | USCS | NO. | DEPTH FROM | DEPTH TO | FIRST 6" | 2ND 6" | 3RD 6" | REC. |
|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 13.5 | BORING ADVANCED TO 13.5 FT WITHOUT SAMPLING | SC | 1 | 13.5 | 15 | 2 | 2 | 2 | |
| | | | SM | 2 | 18.5 | 20 | 1 | 1 | 1 | |
| 13.5 | 18 | VERY LOOSE TAN CLAYEY FINE SAND, WET | SM | 3 | 23.5 | 25 | 12 | 12 | 9 | |
| 18 | 25 | VERY LOOSE TO FIRM DARK GRAY SILTY FINE SAND - TRACE OF SHELL FRAGMENTS, MOIST | | | | | | | | |

NON-DRILLING TIME (Hrs.) _____ REMARKS: CLEAR, 70'S
G LAYOUT _____ MOVING _____
CARING _____ STANDBY _____
WATER LEVEL: @ _____ DATE _____ TIME _____
@ _____ DATE _____ TIME _____
CAVE-IN DEPTH: @ DATE TIME

[illegible] CAROLINA DEPARTMENT OF NATURAL RESOURCES AND COMMUNITY DEVELOPMENT
DIVISION OF ENVIRONMENTAL MANAGEMENT - GROUNDWATER SECTION
P.O. BOX 27687 - RALEIGH, N.C. 27611, PHONE (919) 733-5083

FOR OFFICE USE ONLY
Quad. No. _____ Serial No. _____
Lat. _____ Long. _____ Pc _____
Minor Basin _____
Basin Code _____
Header Ent. _____ GW-1 Ent. _____

# WELL CONSTRUCTION RECORD

DRILLING CONTRACTOR: CAROLINA DRILLING
DRILLER REGISTRATION NUMBER: 726

STATE WELL CONSTRUCTION PERMIT NUMBER: 23-0036-WM-0030

WELL LOCATION: (Show sketch of the location below)
Nearest Town: RIEGELWOOD
FEDERAL PAPER
(Road, Community, or Subdivision and Lot No.)
OWNER: FEDERAL PAPER BOARD CO., INC.
ADDRESS: (Street or Route No.)
RIEGELWOOD, NC 28456
City or Town, State, Zip Code

County: COLUMBUS

DATE DRILLED: 4-28-86 USE OF WELL: MONITOR
TOTAL DEPTH: 24.8 CUTTINGS (SPLITS) COLLECTED: ☒ Yes ☐ No
DOES WELL REPLACE EXISTING WELL? ☐ Yes ☒ No
STATIC WATER LEVEL: 17.21 FT. ☐ above ☒ below TOP OF CASING.
TOP OF CASING IS 3.30 FT. ABOVE LAND SURFACE.
YIELD (gpm): — METHOD OF TEST: —
WATER ZONES (depth): 13.91 Ft
CHLORINATION: Type — Amount —

| Depth From | Depth To | DRILLING LOG Formation Description |
|---|---|---|
| | | ATTACHED |

If additional space is needed use back of form.

CASING:

| | Depth | Diameter | Wall Thickness or Weight/Ft. | Material |
|---|---|---|---|---|
| From 0 | To 14.8 Ft. | 2" | SCH 40 | PVC |
| From | To Ft. | | | |
| From | To Ft. | | | |

GROUT:

| | Depth | Material | Method |
|---|---|---|---|
| From 0 | To 12 Ft. | NEAT | IN-PLACE |
| From | To Ft. | | |

SCREEN:

| | Depth | Diameter | Slot Size | Material |
|---|---|---|---|---|
| From 14.8 | To 24.8 Ft. | 2 in. | .010 in. | PVC |
| From | To Ft. | in. | in. | |
| From | To Ft. | in. | in. | |

GRAVEL PACK:

| | Depth | Size | Material |
|---|---|---|---|
| From 13 | To 25 Ft. | MEDIUM | SAND |
| From | To Ft. | | |

REMARKS:

LOCATION SKETCH
(Show direction and distance from at least two State Roads, or other map reference points)

ATTACHED

I DO HEREBY CERTIFY THAT THIS WELL WAS CONSTRUCTED IN ACCORDANCE WITH 15 NCAC 2C, WELL CONSTRUCTION STANDARDS, AND THAT A COPY OF THIS RECORD HAS BEEN PROVIDED TO THE WELL OWNER.

[illegible] 5-9-86
SIGNATURE OF CONTRACTOR OR AGENT — DATE

CAROLINA DRILLING

246 Two Chopt Road
Wilmington, N.C. 28405
(919) 799-0493

CD PROJECT FEDERAL PAPER - RIEGELWOOD, NC

CD PROJECT # 86-333 BORING # B3 DATE 4-28-86

CLIENT PROJECT # 23-0036-WM-C030 SURFACE ELEVATION (+)33.8 MSL

DRILLER G. BRIDGER CREW R. FOWLER

| DEPTH FROM | DEPTH TO | SOIL STRATA: SOIL DESCRIPTION AND REMARKS | USCS | NO. | DEPTH FROM | DEPTH TO | FIRST 6" | 2ND 6" | 3RD 6" | REC. |
|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 13.5 | BORING ADVANCED TO 13.5 FEET WITHOUT SAMPLING | SP-SM | 1 | 13.5 | 15 | 2 | 1 | 1 | |
| | | | SP-SM | 2 | 18.5 | 20 | 1 | 1 | 1 | |
| 13.5 | 22 | VERY LOOSE TAN FINE SAND - TRACE TO SOME SILT, WET | SM | 3 | 23.5 | 25 | 1 | 1 | 3 | |
| 22 | 25 | VERY LOOSE DARK GRAY SILTY FINE SAND, MOIST | | | | | | | | |

NON-DRILLING TIME (Hrs.) _____ REMARKS: CLEAR, 80'S

NG LAYOUT _____ MOVING _____

EARING _____ STANDBY _____

WATER LEVEL: @ _____ DATE _____ TIME _____

@ _____ DATE _____ TIME _____

CAVE-IN DEPTH: @ _____ DATE _____ TIME _____

DEPARTMENT OF NATURAL RESOURCES AND COMMUNITY DEVELOPMENT
DIVISION OF ENVIRONMENTAL MANAGEMENT - GROUNDWATER SECTION
P.O. BOX 27687 - RALEIGH, N.C. 27611, PHONE (919) 733-5083

FOR OFFICE USE ONLY
Quad. No. _____ Serial No. _____
Lat. _____ Long. _____ Pc _____
Minor Basin _____
Basin Code _____
Header Ent. _____ GW-1 Ent. _____

# WELL CONSTRUCTION RECORD

DRILLING CONTRACTOR CAROLINA DRILLING
DRILLER REGISTRATION NUMBER 728

STATE WELL CONSTRUCTION PERMIT NUMBER: 23-0036-WIM-0030

WELL LOCATION: (Show sketch of the location below)
Nearest Town: RIEGELWOOD
FEDERAL PAPER
(Road, Community, or Subdivision and Lot No.)
County: Columbus

OWNER FEDERAL PAPER BOARD Co., INC
ADDRESS _____ (Street or Route No.)
RIEGELWOOD (City or Town) NC (State) 28456 (Zip Code)

DATE DRILLED 4-28-86 USE OF WELL MONITOR
TOTAL DEPTH 10.3 ~~CUTTINGS~~ SPTS COLLECTED ☒ Yes ☐ No
DOES WELL REPLACE EXISTING WELL? ☐ Yes ☒ No
STATIC WATER LEVEL: 6.79 FT. ☐ above ☒ below TOP OF CASING.
TOP OF CASING IS 2.40 FT. ABOVE LAND SURFACE.
YIELD (gpm): — METHOD OF TEST —
WATER ZONES (depth): 4.39 Ft.

CHLORINATION: Type — Amount —

CASING:

| From | To | Ft. | Diameter | Wall Thickness or Weight/Ft. | Material |
|---|---|---|---|---|---|
| 0 | 5.3 | | 2" | SCH 40 | PVC |
| | | | | | |
| | | | | | |

GROUT:

| From | To | Ft. | Material | Method |
|---|---|---|---|---|
| 0 | 2.3 | | NEAT | IN-PLACE |
| | | | | |

SCREEN:

| From | To | Ft. | Diameter | Slot Size | Material |
|---|---|---|---|---|---|
| 5.3 | 10.3 | | 2 in. | .010 in. | PVC |
| | | | in. | in. | |
| | | | in. | in. | |

GRAVEL PACK:

| From | To | Ft. | Size | Material |
|---|---|---|---|---|
| 4.3 | 11 | | MEDIUM | SAND |
| | | | | |

REMARKS: _____

| Depth From | Depth To | DRILLING LOG Formation Description |
|---|---|---|
| | | ATTACHED |

If additional space is needed use back of form.

LOCATION SKETCH
(Show direction and distance from at least two State Roads, or other map reference points)

ATTACHED

I DO HEREBY CERTIFY THAT THIS WELL WAS CONSTRUCTED IN ACCORDANCE WITH 15 NCAC 2C, WELL CONSTRUCTION STANDARDS, AND THAT A COPY OF THIS RECORD HAS BEEN PROVIDED TO THE WELL OWNER.

[illegible] 5-29-86
SIGNATURE OF CONTRACTOR OR AGENT DATE

TEST BORING FIELD REPORT

CAROLINA DRILLING
246 Two Chopt Road
Wilmington, N.C. 28405
(919) 799-0493

CD PROJECT FEDERAL PAPER - RIEGELWOOD, N.C.

CD PROJECT # 86-333 BORING # B4 DATE 4-28-86

CLIENT PROJECT # 23-0036-WM-0030 SURFACE ELEVATION (+)13.5 MSL

DRILLER G. BRIDGER CREW R. FOWLER

| DEPTH FROM | DEPTH TO | SOIL STRATA: SOIL DESCRIPTION AND REMARKS | USCS | NO. | DEPTH FROM | DEPTH TO | FIRST 6" | 2ND 6" | 3RD 6" | REC. |
|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 8 | VERY LOOSE GRAY FINE SAND, MOIST TO WET | SP | 1 | 3.5 | 5 | 1 | 1 | 1 | |
| | | | SM | 2 | 8.5 | 10 | 3 | 2 | 4 | |
| 8 | 10 | LOOSE DARK GRAY SILTY FINE SAND, MOIST | | | | | | | | |

NON-DRILLING TIME (Hrs.) _____ REMARKS: CLEAR, 70'S

G LAYOUT _____ MOVING _____

LEARING _____ STANDBY _____

WATER LEVEL: @ _____ DATE _____ TIME _____

@ _____ DATE _____ TIME _____

CAVE-IN DEPTH @ DATE TIME

DIVISION OF ENVIRONMENTAL MANAGEMENT - GROUNDWATER SECTION
P.O. BOX 27687 - RALEIGH, N.C. 27611, PHONE (919) 733-5083

FOR OFFICE USE ONLY
Quad. No. _____ Serial No. _____
Lat. _____ Long. _____ Pc _____
Minor Basin _____
Basin Code _____
Header Ent. _____ GW-1 Ent. _____

# WELL CONSTRUCTION RECORD

DRILLING CONTRACTOR Carolina Drilling
DRILLER REGISTRATION NUMBER 728

STATE WELL CONSTRUCTION PERMIT NUMBER: 23-0036-WM-0030

1. WELL LOCATION: (Show sketch of the location below)
Nearest Town: Riegelwood
Federal Paper
(Road, Community, or Subdivision and Lot No.)
County: Columbus

OWNER Federal Paper Board Co., Inc.
ADDRESS _____
(Street or Route No.)
Riegelwood NC 28456
City or Town State Zip Code

DATE DRILLED 4-29-86 USE OF WELL Monitor
TOTAL DEPTH 18.7 ~~CUTTINGS~~ SPTS COLLECTED ☒ Yes ☐ No
DOES WELL REPLACE EXISTING WELL? ☐ Yes ☒ No
STATIC WATER LEVEL: 10.37 FT. ☐ above ☒ below TOP OF CASING.
TOP OF CASING IS 1.70 FT. ABOVE LAND SURFACE.
YIELD (gpm): — METHOD OF TEST —
WATER ZONES (depth): 8.67 Ft

CHLORINATION: Type — Amount —

CASING:

| | Depth From | To | Diameter | Wall Thickness or Weight/Ft. | Material |
|---|---|---|---|---|---|
| | 0 | 8.7 Ft. | 2" | SCH 40 | PVC |
| | | Ft. | | | |
| | | Ft. | | | |

GROUT:

| | Depth From | To | Material | Method |
|---|---|---|---|---|
| | 0 | 6.5 Ft. | NEAT | IN PLACE |
| | | Ft. | | |

SCREEN:

| | Depth From | To | Diameter | Slot Size | Material |
|---|---|---|---|---|---|
| | 8.7 | 18.7 Ft. | 2 in. | .010 in. | PVC |
| | | Ft. | in. | in. | |
| | | Ft. | in. | in. | |

GRAVEL PACK:

| | Depth From | To | Size | Material |
|---|---|---|---|---|
| | 7.5 | 19 Ft. | Medium | SAND |
| | | Ft. | | |

REMARKS: _____

| Depth From | To | DRILLING LOG Formation Description |
|---|---|---|
| | | ATTACHED |

If additional space is needed use back of form.

LOCATION SKETCH
(Show direction and distance from at least two State Roads, or other map reference points)
ATTACHED

I DO HEREBY CERTIFY THAT THIS WELL WAS CONSTRUCTED IN ACCORDANCE WITH 15 NCAC 2C, WELL CONSTRUCTION STANDARDS, AND THAT A COPY OF THIS RECORD HAS BEEN PROVIDED TO THE WELL OWNER.

[illegible] 5-9-86
SIGNATURE OF CONTRACTOR OR AGENT DATE

GW-1 Revised 11/84

AROLINA DRILLING
246 Two Chopt Road
Wilmington, N.C. 28405
(919) 799-0493

TEST BORING LOG REPORT

CD PROJECT FEDERAL PAPER- RIEGELWOOD, NC

CD PROJECT # 86-333 BORING # B5 DATE 4-29-86

CLIENT PROJECT # 23-0036-0000-0030 SURFACE ELEVATION (+)22.0 MSL

DRILLER G. BRIDGER CREW R. FOWLER

| DEPTH FROM | DEPTH TO | SOIL STRATA / SOIL DESCRIPTION AND REMARKS | USCS | NO. | DEPTH FROM | DEPTH TO | FIRST 6" | 2ND 6" | 3RD 6" | REC. |
|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 16 | LOOSE TO FIRM GRAY AND DARK GRAY FINE TO MEDIUM SAND, MOIST TO WET | SP | 1 | 3.5 | 5 | 2 | 4 | 4 | |
| | | | SP | 2 | 8.5 | 10 | 2 | 4 | 3 | |
| 16 | 20 | FIRM DARK GRAY SILTY FINE SAND WITH SOME SILT LAYERS, MOIST | SP | 3 | 13.5 | 15 | 8 | 7 | 4 | |
| | | | SM | 4 | 18.5 | 20 | 5 | 5 | 8 | |

NON-DRILLING TIME (Hrs.) _____ REMARKS: CLEAR, 70'S

LAYOUT _____ MOVING _____

WAITING _____ STANDBY _____

WATER LEVEL: @ _____ DATE _____ TIME _____

@ _____ DATE _____ TIME _____

CAVE-IN DEPTH: @ _____ DATE _____ TIME _____

# Appendix-C

# APPENDIX C

# GROUNDWATER STATISTICAL EVALUATION TABLES

# Test For Normality

MW-1A

| | TDS | TDS | delta | an-i+1 | bi | Cl | Cl | delta | an-i+1 | bi |
|---|---|---|---|---|---|---|---|---|---|---|
| | 60 | 122 | 62 | 0.5739 | 35.5818 | 15 | 24 | 9 | 0.5739 | 5.1651 |
| | 74 | 106 | 32 | 0.3291 | 10.5312 | 16 | 24 | 8 | 0.3291 | 2.6328 |
| | 83 | 98 | 15 | 0.2141 | 3.2115 | 17 | 21 | 4 | 0.2141 | 0.8564 |
| | 83 | 95 | 12 | 0.1224 | 1.4688 | 17 | 19 | 2 | 0.1224 | 0.2448 |
| | 93 | 94 | 1 | 0.0399 | 0.0399 | 17 | 18 | 1 | 0.0399 | 0.0399 |
| | 94 | 93 | -1 | | | 18 | 17 | -1 | | |
| | 95 | 83 | -12 | | | 19 | 17 | -2 | | |
| | 98 | 83 | -15 | | | 21 | 17 | -4 | | |
| | 106 | 74 | -32 | | | 24 | 16 | -8 | | |
| | 122 | 60 | | | | 24 | 15 | | | |
| SD | 17.13217 | 17.13217 | | b= | 50.8332 | 3.190263 | 3.190263 | | b= | 8.939 |
| | | | | W= | 0.9782004 | | | | W= | 0.8723332 |
| | | | | Normal? | YES | | | | Normal? | YES |

MW-4A

| | TDS | TDS | delta | an-i+1 | bi | Cl | Cl | delta | an-i+1 | bi |
|---|---|---|---|---|---|---|---|---|---|---|
| | 89 | 410 | 321 | 0.5739 | 184.2219 | 21 | 50 | 29 | 0.5739 | 16.6431 |
| | 114 | 276 | 162 | 0.3291 | 53.3142 | 23 | 45 | 22 | 0.3291 | 7.2402 |
| | 166 | 266 | 100 | 0.2141 | 21.41 | 25 | 41 | 16 | 0.2141 | 3.4256 |
| | 179 | 242 | 63 | 0.1224 | 7.7112 | 32 | 38 | 6 | 0.1224 | 0.7344 |
| | 183 | 197 | 14 | 0.0399 | 0.5586 | 34 | 37 | 3 | 0.0399 | 0.1197 |
| | 197 | 183 | -14 | | | 37 | 34 | -3 | | |
| | 242 | 179 | -63 | | | 38 | 32 | -6 | | |
| | 266 | 166 | -100 | | | 41 | 25 | -16 | | |
| | 276 | 114 | -162 | | | 45 | 23 | -22 | | |
| | 410 | 89 | | | | 50 | 21 | | | |
| SD | 91.96594 | 91.96594 | | b= | 267.2159 | 9.5591724 | 9.5591724 | | b= | 28.163 |
| | | | | W= | 0.9380546 | | | | W= | 0.9644389 |
| | | | | Normal? | YES | | | | Normal? | YES |

MW-5A

| | TDS | TDS | delta | an-i+1 | bi | Cl | Cl | delta | an-i+1 | bi |
|---|---|---|---|---|---|---|---|---|---|---|
| | 114 | 1820 | 1706 | 0.5739 | 979.0734 | 112 | 713 | 601 | 0.5739 | 344.9139 |
| | 437 | 1770 | 1333 | 0.3291 | 438.6903 | 121 | 607 | 486 | 0.3291 | 159.9426 |
| | 748 | 1760 | 1012 | 0.2141 | 216.6692 | 122 | 573 | 451 | 0.2141 | 96.5591 |
| | 852 | 1730 | 878 | 0.1224 | 107.4672 | 138 | 514 | 376 | 0.1224 | 46.0224 |
| | 1318 | 1618 | 300 | 0.0399 | 11.97 | 194 | 369 | 175 | 0.0399 | 6.9825 |
| | 1618 | 1318 | -300 | | | 369 | 194 | -175 | | |
| | 1730 | 852 | -878 | | | 514 | 138 | -376 | | |
| | 1760 | 748 | -1012 | | | 573 | 122 | -451 | | |
| | 1770 | 437 | -1333 | | | 607 | 121 | -486 | | |
| | 1820 | 114 | | | | 713 | 112 | | | |
| SD | 630.3995 | 630.3995 | | b= | 1753.8701 | 236.88162 | 236.88162 | | b= | 654.4205 |
| | | | | W= | 0.8600438 | | | | W= | 0.8480248 |
| | | | | Normal? | YES | | | | Normal? | YES |

MW-7A

| | TDS | TDS | delta | an-i+1 | bi | Cl | Cl | delta | an-i+1 | bi |
|---|---|---|---|---|---|---|---|---|---|---|
| | 808 | 1602 | 794 | 0.5739 | 455.6766 | 330 | 540 | 210 | 0.5739 | 120.519 |
| | 1019 | 1462 | 443 | 0.3291 | 145.7913 | 383 | 539 | 156 | 0.3291 | 51.3396 |
| | 1030 | 1345 | 315 | 0.2141 | 67.4415 | 391 | 496 | 105 | 0.2141 | 22.4805 |
| | 1030 | 1150 | 120 | 0.1224 | 14.688 | 396 | 430 | 34 | 0.1224 | 4.1616 |
| | 1090 | 1140 | 50 | 0.0399 | 1.995 | 414 | 430 | 16 | 0.0399 | 0.6384 |
| | 1140 | 1090 | -50 | | | 430 | 414 | -16 | | |
| | 1150 | 1030 | -120 | | | 430 | 396 | -34 | | |
| | 1345 | 1030 | -315 | | | 496 | 391 | -105 | | |
| | 1462 | 1019 | -443 | | | 539 | 383 | -156 | | |
| | 1602 | 808 | | | | 540 | 330 | | | |
| SD | 236.4554 | 236.4554 | | b= | 685.5924 | 69.313218 | 69.313218 | | b= | 199.1391 |
| | | | | W= | 0.9340949 | | | | W= | 0.9171459 |
| | | | | Normal? | YES | | | | Normal? | YES |

MW-8A

| | TDS | TDS | delta | an-i+1 | bi | Cl | Cl | delta | an-i+1 | bi |
|---|---|---|---|---|---|---|---|---|---|---|
| | 391 | 809 | 418 | 0.5739 | 239.8902 | 9 | 17 | 8 | 0.5739 | 4.5912 |
| | 418 | 492 | 74 | 0.3291 | 24.3534 | 10 | 17 | 7 | 0.3291 | 2.3037 |
| | 424 | 477 | 53 | 0.2141 | 11.3473 | 11 | 14 | 3 | 0.2141 | 0.6423 |
| | 430 | 465 | 35 | 0.1224 | 4.284 | 12 | 14 | 2 | 0.1224 | 0.2448 |
| | 454 | 464 | 10 | 0.0399 | 0.399 | 12 | 13 | 1 | 0.0399 | 0.0399 |
| | 464 | 454 | -10 | | | 13 | 12 | -1 | | |
| | 465 | 430 | -35 | | | 14 | 12 | -2 | | |
| | 477 | 424 | -53 | | | 14 | 11 | -3 | | |
| | 492 | 418 | -74 | | | 17 | 10 | -7 | | |
| | 809 | 391 | | | | 17 | 9 | | | |
| SD | 118.7408 | 118.7408 | | b= | 280.2739 | 2.6853512 | 2.6853512 | | b= | 7.8219 |
| | | | | W= | 0.6190459 | | | | W= | 0.9427137 |
| | | | | Normal? | NO | | | | Normal? | YES |

# Test For Normality

| Cr | Cr | delta | an-i+1 | bi |
|---|---|---|---|---|
| 0.0025 | 0.38 | 0.3775 | 0.5739 | 0.2166473 |
| 0.0025 | 0.05 | 0.0475 | 0.3291 | 0.0156323 |
| 0.0025 | 0.045 | 0.0425 | 0.2141 | 0.0090993 |
| 0.0025 | 0.0025 | 0 | 0.1224 | 0 |
| 0.0025 | 0.0025 | 0 | 0.0399 | 0 |
| 0.0025 | 0.0025 | 0 | | |
| 0.0025 | 0.0025 | 0 | | |
| 0.045 | 0.0025 | -0.0425 | | |
| 0.05 | 0.0025 | -0.0475 | | |
| 0.38 | 0.0025 | | | |
| 0.1177158 | 0.1177158 | | | |
| | | | b= | 0.2413788 |
| | | | W= | 0.4671818 |
| | | | Normal? | NO |

| Fe | Fe | delta | an-i+1 | bi |
|---|---|---|---|---|
| 0.5 | 48 | 47.5 | 0.5739 | 27.26025 |
| 0.65 | 7.2 | 6.55 | 0.3291 | 2.155605 |
| 0.75 | 4.6 | 3.85 | 0.2141 | 0.824285 |
| 0.83 | 3.65 | 2.82 | 0.1224 | 0.345168 |
| 0.93 | 2.05 | 1.12 | 0.0399 | 0.044688 |
| 2.05 | 0.93 | -1.12 | | |
| 3.65 | 0.83 | -2.82 | | |
| 4.6 | 0.75 | -3.85 | | |
| 7.2 | 0.65 | -6.55 | | |
| 48 | 0.5 | | | |
| 14.602143 | 14.602143 | | | |
| | | | b= | 30.629996 |
| | | | W= | 0.4888979 |
| | | | Normal? | NO |

MW-4A

| Cr | Cr | delta | an-i+1 | bi |
|---|---|---|---|---|
| 0.0025 | 0.12 | 0.1175 | 0.5739 | 0.0674333 |
| 0.0025 | 0.02 | 0.0175 | 0.3291 | 0.0057593 |
| 0.0025 | 0.017 | 0.0145 | 0.2141 | 0.0031045 |
| 0.0025 | 0.0025 | 0 | 0.1224 | 0 |
| 0.0025 | 0.0025 | 0 | 0.0399 | 0 |
| 0.0025 | 0.0025 | 0 | | |
| 0.0025 | 0.0025 | 0 | | |
| 0.017 | 0.0025 | -0.0145 | | |
| 0.02 | 0.0025 | -0.0175 | | |
| 0.12 | 0.0025 | | | |
| 0.0366481 | 0.0366481 | | | |
| | | | b= | 0.076297 |
| | | | W= | 0.4815815 |
| | | | Normal? | NO |

| Fe | Fe | delta | an-i+1 | bi |
|---|---|---|---|---|
| 7.6 | 40 | 32.4 | 0.5739 | 18.59436 |
| 8.25 | 32.5 | 24.25 | 0.3291 | 7.980675 |
| 8.9 | 28 | 19.1 | 0.2141 | 4.08931 |
| 9.4 | 13.5 | 4.1 | 0.1224 | 0.50184 |
| 12 | 12.3 | 0.3 | 0.0399 | 0.01197 |
| 12.3 | 12 | -0.3 | | |
| 13.5 | 9.4 | -4.1 | | |
| 28 | 8.9 | -19.1 | | |
| 32.5 | 8.25 | -24.25 | | |
| 40 | 7.6 | | | |
| 11.725008 | 11.725008 | | | |
| | | | b= | 31.178155 |
| | | | W= | 0.7856553 |
| | | | Normal? | NO |

| Cr | Cr | delta | an-i+1 | bi |
|---|---|---|---|---|
| 0.0025 | 0.08 | 0.0775 | 0.5739 | 0.0444773 |
| 0.008 | 0.055 | 0.047 | 0.3291 | 0.0154677 |
| 0.009 | 0.05 | 0.041 | 0.2141 | 0.0087781 |
| 0.011 | 0.05 | 0.039 | 0.1224 | 0.0047736 |
| 0.011 | 0.013 | 0.002 | 0.0399 | 0.0000798 |
| 0.013 | 0.011 | -0.002 | | |
| 0.05 | 0.011 | -0.039 | | |
| 0.05 | 0.009 | -0.041 | | |
| 0.055 | 0.008 | -0.047 | | |
| 0.08 | 0.0025 | | | |
| 0.0270929 | 0.0270929 | | | |
| | | | b= | 0.0735765 |
| | | | W= | 0.8194535 |
| | | | Normal? | NO |

| Fe | Fe | delta | an-i+1 | bi |
|---|---|---|---|---|
| 3.5 | 38 | 34.5 | 0.5739 | 19.79955 |
| 5 | 27 | 22 | 0.3291 | 7.2402 |
| 6.6 | 18 | 11.4 | 0.2141 | 2.44074 |
| 7 | 16 | 9 | 0.1224 | 1.1016 |
| 9.2 | 14 | 4.8 | 0.0399 | 0.19152 |
| 14 | 9.2 | -4.8 | | |
| 16 | 7 | -9 | | |
| 18 | 6.6 | -11.4 | | |
| 27 | 5 | -22 | | |
| 38 | 3.5 | | | |
| 10.96054 | 10.96054 | | | |
| | | | b= | 30.77361 |
| | | | W= | 0.8758918 |
| | | | Normal? | YES |

MW-7A

| Cr | Cr | delta | an-i+1 | bi |
|---|---|---|---|---|
| 0.0025 | 0.21 | 0.2075 | 0.5739 | 0.1190843 |
| 0.0025 | 0.075 | 0.0725 | 0.3291 | 0.0238598 |
| 0.0025 | 0.065 | 0.0625 | 0.2141 | 0.0133813 |
| 0.0025 | 0.01 | 0.0075 | 0.1224 | 0.000918 |
| 0.006 | 0.007 | 0.001 | 0.0399 | 0.0000399 |
| 0.007 | 0.006 | -0.001 | | |
| 0.01 | 0.0025 | -0.0075 | | |
| 0.065 | 0.0025 | -0.0625 | | |
| 0.075 | 0.0025 | -0.0725 | | |
| 0.21 | 0.0025 | | | |
| 0.0662412 | 0.0662412 | | | |
| | | | b= | 0.1572832 |
| | | | W= | 0.6264194 |
| | | | Normal? | NO |

| Fe | Fe | delta | an-i+1 | bi |
|---|---|---|---|---|
| 23 | 133 | 110 | 0.5739 | 63.129 |
| 33.5 | 64 | 30.5 | 0.3291 | 10.03755 |
| 35.5 | 60 | 24.5 | 0.2141 | 5.24545 |
| 38 | 58 | 20 | 0.1224 | 2.448 |
| 40.5 | 41 | 0.5 | 0.0399 | 0.01995 |
| 41 | 40.5 | -0.5 | | |
| 58 | 38 | -20 | | |
| 60 | 35.5 | -24.5 | | |
| 64 | 33.5 | -30.5 | | |
| 133 | 23 | | | |
| 31.101134 | 31.101134 | | | |
| | | | b= | 80.87995 |
| | | | W= | 0.751427 |
| | | | Normal? | NO |

MW-8A

| Cr | Cr | delta | an-i+1 | bi |
|---|---|---|---|---|
| 0.0025 | 150 | 149.9975 | 0.5739 | 86.083565 |
| 0.0025 | 0.14 | 0.1375 | 0.3291 | 0.0452513 |
| 0.0025 | 0.08 | 0.0775 | 0.2141 | 0.0165928 |
| 0.0025 | 0.011 | 0.0085 | 0.1224 | 0.0010404 |
| 0.0025 | 0.01 | 0.0075 | 0.0399 | 0.0002993 |
| 0.01 | 0.0025 | -0.0075 | | |
| 0.011 | 0.0025 | -0.0085 | | |
| 0.08 | 0.0025 | -0.0775 | | |
| 0.14 | 0.0025 | -0.1375 | | |
| 150 | 0.0025 | | | |
| 47.42528 | 47.42528 | | | |
| | | | b= | 86.146749 |
| | | | W= | 0.3666194 |
| | | | Normal? | NO |

| Fe | Fe | delta | an-i+1 | bi |
|---|---|---|---|---|
| 0.92 | 70 | 69.08 | 0.5739 | 39.645012 |
| 0.98 | 66 | 65.02 | 0.3291 | 21.398082 |
| 3.3 | 38 | 34.7 | 0.2141 | 7.42927 |
| 4.9 | 12 | 7.1 | 0.1224 | 0.86904 |
| 6.4 | 6.8 | 0.4 | 0.0399 | 0.01596 |
| 6.8 | 6.4 | -0.4 | | |
| 12 | 4.9 | -7.1 | | |
| 38 | 3.3 | -34.7 | | |
| 66 | 0.98 | -65.02 | | |
| 70 | 0.92 | | | |
| 27.053974 | 27.053974 | | | |
| | | | b= | 69.357364 |
| | | | W= | 0.730265 |
| | | | Normal? | NO |

## Test For Normality

| Mn | Mn | delta | an-i+1 | bi |
|---|---|---|---|---|
| 0.005 | 0.2 | 0.195 | 0.5739 | 0.1119105 |
| 0.006 | 0.035 | 0.029 | 0.3291 | 0.0095439 |
| 0.006 | 0.011 | 0.005 | 0.2141 | 0.0010705 |
| 0.007 | 0.01 | 0.003 | 0.1224 | 0.0003672 |
| 0.009 | 0.009 | 0 | 0.0399 | 0 |
| 0.009 | 0.009 | 0 | | |
| 0.01 | 0.007 | -0.003 | | |
| 0.011 | 0.006 | -0.005 | | |
| 0.035 | 0.006 | -0.029 | | |
| 0.2 | 0.005 | | | |
| 0.0604369 | 0.0604369 | | b= | 0.1228921 |
| | | | W= | 0.4594102 |
| | | | Normal? | NO |

| Mn | Mn | delta | an-i+1 | bi |
|---|---|---|---|---|
| 0.045 | 0.15 | 0.105 | 0.5739 | 0.0602595 |
| 0.05 | 0.105 | 0.055 | 0.3291 | 0.0181005 |
| 0.055 | 0.1 | 0.045 | 0.2141 | 0.0096345 |
| 0.065 | 0.1 | 0.035 | 0.1224 | 0.004284 |
| 0.08 | 0.1 | 0.02 | 0.0399 | 0.000798 |
| 0.1 | 0.08 | -0.02 | | |
| 0.1 | 0.065 | -0.035 | | |
| 0.1 | 0.055 | -0.045 | | |
| 0.105 | 0.05 | -0.055 | | |
| 0.15 | 0.045 | | | |
| 0.0324037 | 0.0324037 | | b= | 0.0930765 |
| | | | W= | 0.9167444 |
| | | | Normal? | YES |

MW-5A

| Mn | Mn | delta | an-i+1 | bi |
|---|---|---|---|---|
| 0.3 | 0.8 | 0.5 | 0.5739 | 0.28695 |
| 0.38 | 0.745 | 0.365 | 0.3291 | 0.1201215 |
| 0.39 | 0.65 | 0.26 | 0.2141 | 0.055666 |
| 0.4 | 0.58 | 0.18 | 0.1224 | 0.022032 |
| 0.55 | 0.56 | 0.01 | 0.0399 | 0.000399 |
| 0.56 | 0.55 | -0.01 | | |
| 0.58 | 0.4 | -0.18 | | |
| 0.65 | 0.39 | -0.26 | | |
| 0.745 | 0.38 | -0.365 | | |
| 0.8 | 0.3 | | | |
| 0.1663071 | 0.1663071 | | b= | 0.4851685 |
| | | | W= | 0.9456296 |
| | | | Normal? | YES |

| Mn | Mn | delta | an-i+1 | bi |
|---|---|---|---|---|
| 0.55 | 1.7 | 1.15 | 0.5739 | 0.659985 |
| 0.565 | 0.875 | 0.31 | 0.3291 | 0.102021 |
| 0.63 | 0.8 | 0.17 | 0.2141 | 0.036397 |
| 0.735 | 0.95 | 0.215 | 0.1224 | 0.026316 |
| 0.75 | 0.85 | 0.1 | 0.0399 | 0.00399 |
| 0.8 | 0.565 | -0.235 | | |
| 0.85 | 0.63 | -0.22 | | |
| 0.875 | 0.55 | -0.325 | | |
| 0.95 | 0.75 | -0.2 | | |
| 1.7 | 0.735 | | | |
| 0.3295742 | 0.3295742 | | b= | 0.828709 |
| | | | W= | 0.7025142 |
| | | | Normal? | NO |

| Mn | Mn | delta | an-i+1 | bi |
|---|---|---|---|---|
| 0.125 | 0.78 | 0.655 | 0.5739 | 0.3759045 |
| 0.15 | 0.575 | 0.425 | 0.3291 | 0.1398675 |
| 0.17 | 0.485 | 0.315 | 0.2141 | 0.0674415 |
| 0.23 | 0.4 | 0.17 | 0.1224 | 0.020808 |
| 0.25 | 0.34 | 0.09 | 0.0399 | 0.003591 |
| 0.34 | 0.25 | -0.09 | | |
| 0.4 | 0.23 | -0.17 | | |
| 0.485 | 0.17 | -0.315 | | |
| 0.575 | 0.15 | -0.425 | | |
| 0.78 | 0.125 | | | |
| 0.2118103 | 0.2118103 | | b= | 0.6076125 |
| | | | W= | 0.9143588 |
| | | | Normal? | YES |

## Test For Lognormality

| TDS | TDS | delta | an-i+1 | bi |
|---|---|---|---|---|
| 4.09 | 4.80 | 0.7096765 | 0.5739 | 0.4072833 |
| 4.30 | 4.66 | 0.359374 | 0.3291 | 0.11827 |
| 4.42 | 4.58 | 0.1661269 | 0.2141 | 0.0355678 |
| 4.42 | 4.55 | 0.1350363 | 0.1224 | 0.0165284 |
| 4.53 | 4.54 | 0.0106953 | 0.0399 | 0.0004267 |
| 4.54 | 4.53 | -0.0106953 | | |
| 4.55 | 4.42 | -0.1350363 | | |
| 4.58 | 4.42 | -0.1661269 | | |
| 4.66 | 4.30 | -0.359374 | | |
| 4.80 | 4.09 | | | |
| 0.1965405 | 0.1965405 | | b= | 0.5780763 |
| | | | W= | 0.9612223 |
| | | | Normal? | YES |

MW-4A

| TDS | TDS | delta | an-i+1 | bi |
|---|---|---|---|---|
| 4.49 | 6.02 | 1.5275208 | 0.5739 | 0.8766442 |
| 4.74 | 5.62 | 0.8842024 | 0.3291 | 0.290991 |
| 5.11 | 5.58 | 0.4715085 | 0.2141 | 0.10095 |
| 5.19 | 5.49 | 0.3015519 | 0.1224 | 0.03691 |
| 5.21 | 5.28 | 0.0737176 | 0.0399 | 0.0029413 |
| 5.28 | 5.21 | -0.0737176 | | |
| 5.49 | 5.19 | -0.3015519 | | |
| 5.58 | 5.11 | -0.4715085 | | |
| 5.62 | 4.74 | -0.8842024 | | |
| 6.02 | 4.49 | | | |
| 0.441812 | 0.441812 | | b= | 1.3084365 |
| | | | W= | 0.9745134 |
| | | | Normal? | YES |

| TDS | TDS | delta | an-i+1 | bi |
|---|---|---|---|---|
| 4.74 | 7.51 | 2.7703933 | 0.5739 | 1.5899287 |
| 6.08 | 7.48 | 1.3988016 | 0.3291 | 0.4603456 |
| 6.62 | 7.47 | 0.8556661 | 0.2141 | 0.1831981 |
| 6.75 | 7.46 | 0.7082902 | 0.1224 | 0.0866947 |
| 7.18 | 7.39 | 0.2050754 | 0.0399 | 0.0081825 |
| 7.39 | 7.18 | -0.2050754 | | |
| 7.46 | 6.75 | -0.7082902 | | |
| 7.47 | 6.62 | -0.8556661 | | |
| 7.48 | 6.08 | -1.3988016 | | |
| 7.51 | 4.74 | | | |
| 0.8886053 | 0.8886053 | | b= | 2.3283497 |
| | | | W= | 0.7628446 |
| | | | Normal? | NO |

MW-7A

| TDS | TDS | delta | an-i+1 | bi |
|---|---|---|---|---|
| 6.69 | 7.38 | 0.6844461 | 0.5739 | 0.3928036 |
| 6.93 | 7.29 | 0.3609836 | 0.3291 | 0.1187997 |
| 6.94 | 7.20 | 0.2668352 | 0.2141 | 0.0571294 |
| 6.94 | 7.05 | 0.1102031 | 0.1224 | 0.0134889 |
| 6.99 | 7.04 | 0.0448506 | 0.0399 | 0.0017895 |
| 7.04 | 6.99 | -0.0448506 | | |
| 7.05 | 6.94 | -0.1102031 | | |
| 7.20 | 6.94 | -0.2668352 | | |
| 7.29 | 6.93 | -0.3609836 | | |
| 7.38 | 6.69 | | | |
| 0.1995552 | 0.1995552 | | b= | 0.5840111 |
| | | | W= | 0.9516418 |
| | | | Normal? | YES |

MW-8A

| TDS | TDS | delta | an-i+1 | bi |
|---|---|---|---|---|
| 5.97 | 6.70 | 0.7270914 | 0.5739 | 0.4172777 |
| 6.04 | 6.20 | 0.1629973 | 0.3291 | 0.0536424 |
| 6.05 | 6.17 | 0.117783 | 0.2141 | 0.0252173 |
| 6.06 | 6.14 | 0.0782522 | 0.1224 | 0.0095781 |
| 6.12 | 6.14 | 0.0217874 | 0.0399 | 0.0008693 |
| 6.14 | 6.12 | -0.0217874 | | |
| 6.14 | 6.06 | -0.0782522 | | |
| 6.17 | 6.05 | -0.117783 | | |
| 6.20 | 6.04 | -0.1629973 | | |
| 6.70 | 5.97 | | | |
| 0.2012661 | 0.2012661 | | b= | 0.5065849 |
| | | | W= | 0.7039156 |
| | | | Normal? | NO |

# Test For Lognormality

| Cl | Cl | delta | an-i+1 | bi |
|---|---|---|---|---|
| 2.71 | 3.18 | 0.4700036 | 0.5739 | 0.2697351 |
| 2.77 | 3.18 | 0.4054651 | 0.3291 | 0.1334386 |
| 2.83 | 3.04 | 0.2113091 | 0.2141 | 0.0452413 |
| 2.83 | 2.94 | 0.1112256 | 0.1224 | 0.013614 |
| 2.83 | 2.89 | 0.0571584 | 0.0399 | 0.0022806 |
| 2.89 | 2.83 | -0.0571584 | | |
| 2.94 | 2.83 | -0.1112256 | | |
| 3.04 | 2.83 | -0.2113091 | | |
| 3.18 | 2.77 | -0.4054651 | | |
| 3.18 | 2.71 | | | |
| 0.1441771 | 0.1535949 | | | |

b= 0.4643096
W= 1.1523394
Normal? YES

| Cl | Cl | delta | an-i+1 | bi |
|---|---|---|---|---|
| 3.04 | 3.91 | 0.8675006 | 0.5739 | 0.4978586 |
| 3.14 | 3.81 | 0.6711683 | 0.3291 | 0.2208815 |
| 3.22 | 3.71 | 0.4946962 | 0.2141 | 0.1059145 |
| 3.47 | 3.64 | 0.1718503 | 0.1224 | 0.0210345 |
| 3.53 | 3.61 | 0.0845574 | 0.0399 | 0.0033738 |
| 3.61 | 3.53 | -0.0845574 | | |
| 3.64 | 3.47 | -0.1718503 | | |
| 3.71 | 3.22 | -0.4946962 | | |
| 3.81 | 3.14 | -0.6711683 | | |
| 3.91 | 3.04 | | | |
| 0.2690833 | 0.2558147 | | | |

b= 0.8490628
W= 1.1062764
Normal? YES

| Cl | Cl | delta | an-i+1 | bi |
|---|---|---|---|---|
| 4.72 | 6.57 | 1.8509825 | 0.5739 | 1.0622789 |
| 4.80 | 6.41 | 1.6127382 | 0.3291 | 0.5307522 |
| 4.80 | 6.35 | 1.5468647 | 0.2141 | 0.3311837 |
| 4.93 | 6.24 | 1.3149696 | 0.1224 | 0.1609523 |
| 5.27 | 5.91 | 0.6429385 | 0.0399 | 0.0256532 |
| 5.91 | 5.27 | -0.6429385 | | |
| 6.24 | 4.93 | -1.3149696 | | |
| 6.35 | 4.80 | -1.5468647 | | |
| 6.41 | 4.80 | -1.6127382 | | |
| 6.57 | 4.72 | | | |
| 0.7281345 | 0.743665 | | | |

b= 2.1108203
W= 0.9337632
Normal? YES

| Cl | Cl | delta | an-i+1 | bi |
|---|---|---|---|---|
| 5.80 | 6.29 | 0.4924765 | 0.5739 | 0.2826323 |
| 5.95 | 6.29 | 0.3416806 | 0.3291 | 0.1124471 |
| 5.97 | 6.21 | 0.2378684 | 0.2141 | 0.0509276 |
| 5.98 | 6.06 | 0.082371 | 0.1224 | 0.0100822 |
| 6.03 | 6.06 | 0.0379192 | 0.0399 | 0.001513 |
| 6.06 | 6.03 | -0.0379192 | | |
| 6.06 | 5.98 | -0.082371 | | |
| 6.21 | 5.97 | -0.2378684 | | |
| 6.29 | 5.95 | -0.3416806 | | |
| 6.29 | 5.80 | | | |
| 0.1442336 | 0.135164 | | | |

b= 0.4576021
W= 1.1184093
Normal? YES

| Cl | Cl | delta | an-i+1 | bi |
|---|---|---|---|---|
| 2.20 | 2.83 | 0.6359888 | 0.5739 | 0.364994 |
| 2.30 | 2.83 | 0.5306283 | 0.3291 | 0.1746298 |
| 2.40 | 2.64 | 0.2411621 | 0.2141 | 0.0516328 |
| 2.48 | 2.64 | 0.1541507 | 0.1224 | 0.018868 |
| 2.48 | 2.56 | 0.0800427 | 0.0399 | 0.0031937 |
| 2.56 | 2.48 | -0.0800427 | | |
| 2.64 | 2.48 | -0.1541507 | | |
| 2.64 | 2.40 | -0.2411621 | | |
| 2.83 | 2.30 | -0.5306283 | | |
| 2.83 | 2.20 | | | |
| 0.1921057 | 0.1814742 | | | |

b= 0.6133183
W= 1.1325271
Normal? YES

MW-1A

| Cr | Cr | delta | an-i+1 | bi |
|---|---|---|---|---|
| -5.99 | -0.97 | 5.0238805 | 0.5739 | 2.883205 |
| -5.99 | -3.00 | 2.9957323 | 0.3291 | 0.9858955 |
| -5.99 | -3.10 | 2.8903718 | 0.2141 | 0.6188286 |
| -5.99 | -5.99 | 0 | 0.1224 | 0 |
| -5.99 | -5.99 | 0 | 0.0399 | 0 |
| -5.99 | -5.99 | 0 | | |
| -5.99 | -5.99 | 0 | | |
| -3.10 | -5.99 | -2.8903718 | | |
| -3.00 | -5.99 | -2.9957323 | | |
| -0.97 | -5.99 | | | |
| 1.8458741 | 1.8458741 | | | |

b= 4.4879291
W= 0.6568184
Normal? NO

MW-4A

| Cr | Cr | delta | an-i+1 | bi |
|---|---|---|---|---|
| -5.99 | -2.12 | 3.871201 | 0.5739 | 2.2216823 |
| -5.99 | -3.91 | 2.0794415 | 0.3291 | 0.6843442 |
| -5.99 | -4.07 | 1.9169226 | 0.2141 | 0.4104131 |
| -5.99 | -5.99 | 0 | 0.1224 | 0 |
| -5.99 | -5.99 | 0 | 0.0399 | 0 |
| -5.99 | -5.99 | 0 | | |
| -5.99 | -5.99 | 0 | | |
| -4.07 | -5.99 | -1.9169226 | | |
| -3.91 | -5.99 | -2.0794415 | | |
| -2.12 | -5.99 | | | |
| 1.3660571 | 1.3660571 | | | |

b= 3.3164396
W= 0.6548834
Normal? NO

| Cr | Cr | delta | an-i+1 | bi |
|---|---|---|---|---|
| -5.99 | -2.53 | 3.4657359 | 0.5739 | 1.9889858 |
| -4.83 | -2.90 | 1.9278916 | 0.3291 | 0.6344691 |
| -4.71 | -3.00 | 1.7147984 | 0.2141 | 0.3671383 |
| -4.51 | -3.00 | 1.5141277 | 0.1224 | 0.1853292 |
| -4.51 | -4.34 | 0.1670541 | 0.0399 | 0.0066655 |
| -4.34 | -4.51 | -0.1670541 | | |
| -3.00 | -4.51 | -1.5141277 | | |
| -3.00 | -4.71 | -1.7147984 | | |
| -2.90 | -4.83 | -1.9278916 | | |
| -2.53 | -5.99 | | | |
| 1.1147663 | 1.1147663 | | | |

b= 3.182588
W= 0.9056297
Normal? YES

MW-7A

| Cr | Cr | delta | an-i+1 | bi |
|---|---|---|---|---|
| -5.99 | -1.56 | 4.4308168 | 0.5739 | 2.5428458 |
| -5.99 | -2.59 | 3.4011974 | 0.3291 | 1.1193341 |
| -5.99 | -2.73 | 3.2580965 | 0.2141 | 0.6975585 |
| -5.99 | -4.61 | 1.3862944 | 0.1224 | 0.1696824 |
| -5.12 | -4.96 | 0.1541507 | 0.0399 | 0.0061506 |
| -4.96 | -5.12 | -0.1541507 | | |
| -4.61 | -5.99 | -1.3862944 | | |
| -2.73 | -5.99 | -3.2580965 | | |
| -2.59 | -5.99 | -3.4011974 | | |
| -1.56 | -5.99 | | | |
| 1.662699 | 1.662699 | | | |

b= 4.5355713
W= 0.8267881
Normal? NO

MW-8A

| Cr | Cr | delta | an-i+1 | bi |
|---|---|---|---|---|
| -5.99 | 5.01 | 11.0021 | 0.5739 | 6.3141051 |
| -5.99 | -1.97 | 4.0253517 | 0.3291 | 1.3247432 |
| -5.99 | -2.53 | 3.4657359 | 0.2141 | 0.7420141 |
| -5.99 | -4.51 | 1.4816045 | 0.1224 | 0.1813484 |
| -5.99 | -4.61 | 1.3862944 | 0.0399 | 0.0553131 |
| -4.61 | -5.99 | -1.3862944 | | |
| -4.51 | -5.99 | -1.4816045 | | |
| -2.53 | -5.99 | -3.4657359 | | |
| -1.97 | -5.99 | -4.0253517 | | |
| 5.01 | -5.99 | | | |
| 3.4600634 | 3.4600634 | | | |

b= 8.6175239
W= 0.6892145
Normal? NO

# Test For Lognormality

| Fe | Fe | delta | an-i+1 | bi |
|---|---|---|---|---|
| -0.69 | 3.87 | 4.5643482 | 0.5739 | 2.6194794 |
| -0.43 | 1.97 | 2.4048639 | 0.3291 | 0.7914407 |
| -0.29 | 1.53 | 1.8137384 | 0.2141 | 0.3883214 |
| -0.19 | 1.29 | 1.4810567 | 0.1224 | 0.1812813 |
| -0.07 | 0.72 | 0.7904105 | 0.0399 | 0.0315374 |
| 0.72 | -0.07 | -0.7904105 | | |
| 1.29 | -0.19 | -1.4810567 | | |
| 1.53 | -0.29 | -1.8137384 | | |
| 1.97 | -0.43 | -2.4048639 | | |
| 3.87 | -0.69 | | | |
| 1.4237191 | 1.4237191 | | | |

b= 4.0120603
W= 0.8823559
Normal? YES

| Fe | Fe | delta | an-i+1 | bi |
|---|---|---|---|---|
| 2.03 | 3.69 | 1.6607312 | 0.5739 | 0.9530936 |
| 2.11 | 3.48 | 1.3710269 | 0.3291 | 0.4512049 |
| 2.19 | 3.33 | 1.1461532 | 0.2141 | 0.2453914 |
| 2.24 | 2.60 | 0.36198 | 0.1224 | 0.0443064 |
| 2.48 | 2.51 | 0.0246926 | 0.0399 | 0.0009852 |
| 2.51 | 2.48 | -0.0246926 | | |
| 2.60 | 2.24 | -0.36198 | | |
| 3.33 | 2.19 | -1.1461532 | | |
| 3.48 | 2.11 | -1.3710269 | | |
| 3.69 | 2.03 | | | |
| 0.6094593 | 0.6094593 | | | |

b= 1.6949816
W= 0.8594053
Normal? YES

| Fe | Fe | delta | an-i+1 | bi |
|---|---|---|---|---|
| 1.25 | 3.64 | 2.3848232 | 0.5739 | 1.36865 |
| 1.61 | 3.30 | 1.686399 | 0.3291 | 0.5549939 |
| 1.89 | 2.89 | 1.0033021 | 0.2141 | 0.214807 |
| 1.95 | 2.77 | 0.8266786 | 0.1224 | 0.1011855 |
| 2.22 | 2.64 | 0.4198538 | 0.0399 | 0.0167522 |
| 2.64 | 2.22 | -0.4198538 | | |
| 2.77 | 1.95 | -0.8266786 | | |
| 2.89 | 1.89 | -1.0033021 | | |
| 3.30 | 1.61 | -1.686399 | | |
| 3.64 | 1.25 | | | |
| 0.7609539 | 0.7609539 | | | |

b= 2.2563885
W= 0.9769415
Normal? YES

| Fe | Fe | delta | an-i+1 | bi |
|---|---|---|---|---|
| 3.14 | 4.89 | 1.7548549 | 0.5739 | 1.0071112 |
| 3.51 | 4.16 | 0.6473376 | 0.3291 | 0.2130388 |
| 3.57 | 4.09 | 0.5248119 | 0.2141 | 0.1123622 |
| 3.64 | 4.06 | 0.4228569 | 0.1224 | 0.0517577 |
| 3.70 | 3.71 | 0.0122701 | 0.0399 | 0.0004896 |
| 3.71 | 3.70 | -0.0122701 | | |
| 4.06 | 3.64 | -0.4228569 | | |
| 4.09 | 3.57 | -0.5248119 | | |
| 4.16 | 3.51 | -0.6473376 | | |
| 4.89 | 3.14 | | | |
| 0.4797254 | 0.4797254 | | | |

b= 1.3847595
W= 0.9258077
Normal? YES

| Fe | Fe | delta | an-i+1 | bi |
|---|---|---|---|---|
| -0.08 | 4.25 | 4.3318769 | 0.5739 | 2.4860641 |
| -0.02 | 4.19 | 4.2098574 | 0.3291 | 1.3854641 |
| 1.19 | 3.64 | 2.4436637 | 0.2141 | 0.5231884 |
| 1.59 | 2.48 | 0.8956714 | 0.1224 | 0.1096302 |
| 1.86 | 1.92 | 0.0606246 | 0.0399 | 0.0024189 |
| 1.92 | 1.86 | -0.0606246 | | |
| 2.48 | 1.59 | -0.8956714 | | |
| 3.64 | 1.19 | -2.4436637 | | |
| 4.19 | -0.02 | -4.2098574 | | |
| 4.25 | -0.08 | | | |
| 1.56106 | 1.56106 | | | |

b= 4.5067657
W= 0.9260795
Normal? YES

| Mn | Mn | delta | an-i+1 | bi |
|---|---|---|---|---|
| -5.30 | -1.61 | 3.6888795 | 0.5739 | 2.1170479 |
| -5.12 | -3.35 | 1.7635886 | 0.3291 | 0.580397 |
| -5.12 | -4.51 | 0.6061358 | 0.2141 | 0.1297737 |
| -4.96 | -4.61 | 0.3566749 | 0.1224 | 0.043657 |
| -4.71 | -4.71 | 0 | 0.0399 | 0 |
| -4.71 | -4.71 | 0 | | |
| -4.61 | -4.96 | -0.3566749 | | |
| -4.51 | -5.12 | -0.6061358 | | |
| -3.35 | -5.12 | -1.7635886 | | |
| -1.61 | -5.30 | | | |
| 1.1195061 | 1.1195061 | | | |

b= 2.8708756
W= 0.7306903
Normal? NO

| Mn | Mn | delta | an-i+1 | bi |
|---|---|---|---|---|
| -3.10 | -1.90 | 1.2039728 | 0.5739 | 0.69096 |
| -3.00 | -2.25 | 0.7419373 | 0.3291 | 0.2441716 |
| -2.90 | -2.30 | 0.597837 | 0.2141 | 0.1279969 |
| -2.73 | -2.30 | 0.4307829 | 0.1224 | 0.0527278 |
| -2.53 | -2.30 | 0.2231436 | 0.0399 | 0.0089034 |
| -2.30 | -2.53 | -0.2231436 | | |
| -2.30 | -2.73 | -0.4307829 | | |
| -2.30 | -2.90 | -0.597837 | | |
| -2.25 | -3.00 | -0.7419373 | | |
| -1.90 | -3.10 | | | |
| 0.3878143 | 0.3878143 | | | |

b= 1.1247597
W= 0.9346078
Normal? YES

| Mn | Mn | delta | an-i+1 | bi |
|---|---|---|---|---|
| -1.20 | -0.22 | 0.9808293 | 0.5739 | 0.5628979 |
| -0.97 | -0.29 | 0.673213 | 0.3291 | 0.2215544 |
| -0.94 | -0.43 | 0.5108256 | 0.2141 | 0.1093678 |
| -0.92 | -0.54 | 0.3715636 | 0.1224 | 0.0454794 |
| -0.60 | -0.58 | 0.0180185 | 0.0399 | 0.0007189 |
| -0.58 | -0.60 | -0.0180185 | | |
| -0.54 | -0.92 | -0.3715636 | | |
| -0.43 | -0.94 | -0.5108256 | | |
| -0.29 | -0.97 | -0.673213 | | |
| -0.22 | -1.20 | | | |
| 0.3223438 | 0.3223438 | | | |

b= 0.9400184
W= 0.9449125
Normal? YES

| Mn | Mn | delta | an-i+1 | bi |
|---|---|---|---|---|
| -0.60 | 0.53 | 1.1284653 | 0.5739 | 0.6476262 |
| -0.57 | -0.13 | 0.4373982 | 0.3291 | 0.1439477 |
| -0.46 | -0.22 | 0.2388919 | 0.2141 | 0.0511468 |
| -0.31 | -0.05 | 0.2565915 | 0.1224 | 0.0314068 |
| -0.29 | -0.16 | 0.1251631 | 0.0399 | 0.004994 |
| -0.22 | -0.57 | -0.347786 | | |
| -0.16 | -0.46 | -0.2995165 | | |
| -0.13 | -0.60 | -0.4643056 | | |
| -0.05 | -0.29 | -0.2363888 | | |
| 0.53 | -0.31 | | | |
| 0.3230162 | 0.3230162 | | | |

b= 0.8791215
W= 0.8230132
Normal? NO

| Mn | Mn | delta | an-i+1 | bi |
|---|---|---|---|---|
| -2.08 | -0.25 | 1.8309802 | 0.5739 | 1.0507995 |
| -1.90 | -0.55 | 1.3437347 | 0.3291 | 0.4422231 |
| -1.77 | -0.72 | 1.0483505 | 0.2141 | 0.2244518 |
| -1.47 | -0.92 | 0.5533852 | 0.1224 | 0.0677344 |
| -1.39 | -1.08 | 0.3074847 | 0.0399 | 0.0122686 |
| -1.08 | -1.39 | -0.3074847 | | |
| -0.92 | -1.47 | -0.5533852 | | |
| -0.72 | -1.77 | -1.0483505 | | |
| -0.55 | -1.90 | -1.3437347 | | |
| -0.25 | -2.08 | | | |
| 0.609012 | 0.609012 | | | |

b= 1.7974775
W= 0.9679048
Normal? YES

## Summary Table

### Normality

| | MW-1A | MW-4A | MW-5A | MW-7A | MW-8A |
|---|---|---|---|---|---|
| TDS | YES | YES | YES | YES | NO |
| W | 0.98 | 0.94 | 0.86 | 0.93 | 0.62 |
| Cl | YES | YES | YES | YES | YES |
| W | 0.87 | 0.96 | 0.85 | 0.92 | 0.94 |
| Cr | NO | NO | NO | NO | NO |
| W | 0.47 | 0.48 | 0.82 | 0.63 | 0.37 |
| Fe | NO | NO | YES | NO | NO |
| W | 0.49 | 0.79 | 0.88 | 0.75 | 0.73 |
| Mn | NO | YES | YES | NO | YES |
| W | 0.46 | 0.92 | 0.95 | 0.70 | 0.91 |

### LogNormality

| | MW-1A | MW-4A | MW-5A | MW-7A | MW-8A |
|---|---|---|---|---|---|
| TDS | YES | YES | NO | YES | NO |
| W | 0.96 | 0.97 | 0.76 | 0.95 | 0.70 |
| Cl | YES | YES | YES | YES | YES |
| W | 1.15 | 1.11 | 0.93 | 1.12 | 1.13 |
| Cr | NO | NO | YES | NO | NO |
| W | 0.66 | 0.65 | 0.91 | 0.83 | 0.69 |
| Fe | YES | YES | YES | YES | YES |
| W | 0.88 | 0.86 | 0.98 | 0.93 | 0.93 |
| Mn | NO | YES | YES | NO | YES |
| W | 0.73 | 0.93 | 0.94 | 0.82 | 0.97 |

| | MW-1A | MW-4A | MW-5A | MW-7A | MW-8A |
|---|---|---|---|---|---|
| TDS | normal | lognormal | normal | lognormal | neither |
| Cl | lognormal | lognormal | lognormal | lognormal | lognormal |
| Cr | neither | neither | lognormal | neither | neither |
| Fe | lognormal | lognormal | lognormal | lognormal | lognormal |
| Mn | neither | lognormal | normal | neither | lognormal |

Natural Log of Data

| | MW-1A TDS | MW-4A TDS | MW-7A TDS |
|---|---|---|---|
| 1988 | 4.86 | 4.61 | 6.99 |
| 1989 | 4.09 | 4.49 | 7.29 |
| 1990 | 4.66 | 5.11 | 7.38 |
| 1991 | 4.42 | 5.21 | 6.93 |
| 1992 | 4.80 | 5.62 | 7.20 |
| Apr-93 | 4.30 | 5.28 | 6.94 |
| Mar-94 | 4.42 | 6.02 | 6.69 |
| Sep-94 | 4.54 | 4.74 | 6.94 |
| Apr-95 | 4.58 | 5.58 | 6.99 |
| Sep-95 | 4.55 | 5.19 | 7.05 |
| Apr-96 | 4.53 | 5.49 | 7.04 |
| | | | |
| Low | 4.37 | 4.88 | 6.91 |
| Mean | 4.53 | 5.21 | 7.04 |
| High | 4.68 | 5.54 | 7.17 |
| St. Dev. | 0.22 | 0.46 | 0.19 |
| | | | |
| Low | 79.23 | 132.20 | 998.59 |
| Mean | 92.32 | 183.44 | 1141.55 |
| High | 107.57 | 254.55 | 1304.98 |

| | MW-5A Cr | MW-4A Mn | MW-8A Mn |
|---|---|---|---|
| 1988 | | -3.41 | -3.69 |
| 1989 | -2.53 | -1.90 | -0.25 |
| 1990 | -4.83 | -3.00 | -1.47 |
| 1991 | -3.00 | -2.30 | -0.55 |
| 1992 | -3.00 | -2.30 | -0.92 |
| Apr-93 | -4.51 | -2.53 | -2.08 |
| Mar-94 | -5.30 | -2.90 | -1.77 |
| Sep-94 | -4.51 | -3.10 | -1.08 |
| Apr-95 | -4.34 | -2.30 | -0.72 |
| Sep-95 | -4.71 | -2.73 | -1.39 |
| Apr-96 | -2.90 | -2.25 | -1.90 |
| | | | |
| Low | -4.70 | -2.95 | -2.14 |
| Mean | -3.96 | -2.61 | -1.44 |
| High | -3.22 | -2.27 | -0.74 |
| St. Dev. | 0.99 | 0.45 | 0.94 |
| | | | |
| Low | 0.01 | 0.05 | 0.12 |
| Mean | 0.02 | 0.07 | 0.24 |
| High | 0.04 | 0.10 | 0.48 |

| | MW-1A Cl | MW-4A Cl | MW-5A Cl | MW-7A Cl | MW-8A Cl |
|---|---|---|---|---|---|
| 1988 | 2.64 | 2.20 | 5.90 | 5.99 | 2.56 |
| 1989 | 2.71 | 3.14 | 4.80 | 6.29 | 2.56 |
| 1990 | 3.18 | 3.61 | 4.93 | 6.21 | 2.83 |
| 1991 | 2.83 | 3.91 | 5.91 | 5.95 | 2.83 |
| 1992 | 3.18 | 3.64 | 4.80 | 6.29 | 2.64 |
| Apr-93 | 2.83 | 3.53 | 6.57 | 6.03 | 2.40 |
| Mar-94 | 2.94 | 3.22 | 5.27 | 5.80 | 2.30 |
| Sep-94 | 3.04 | 3.04 | 4.72 | 5.97 | 2.48 |
| Apr-95 | 2.83 | 3.81 | 6.24 | 5.98 | 2.48 |
| Sep-95 | 2.77 | 3.47 | 6.35 | 6.06 | 2.20 |
| Apr-96 | 2.89 | 3.71 | 6.41 | 6.06 | 2.64 |
| | | | | | |
| Low | 2.77 | 3.05 | 5.11 | 5.95 | 2.40 |
| Mean | 2.90 | 3.39 | 5.63 | 6.06 | 2.54 |
| High | 3.02 | 3.73 | 6.14 | 6.16 | 2.68 |
| St. Dev. | 0.18 | 0.48 | 0.73 | 0.15 | 0.20 |
| | | | | | |
| Low | 15.98 | 21.09 | 165.77 | 383.79 | 11.03 |
| Mean | 18.10 | 29.61 | 277.78 | 427.01 | 12.68 |
| High | 20.50 | 41.58 | 465.49 | 475.11 | 14.58 |

| | MW-5A TDS | MW-5A Mn |
|---|---|---|
| 1988 | 992 | 0.352 |
| 1989 | 852 | 0.58 |
| 1990 | 1618 | 0.4 |
| 1991 | 1318 | 0.56 |
| 1992 | 748 | 0.38 |
| Apr-93 | 1820 | 0.8 |
| Mar-94 | 114 | 0.39 |
| Sep-94 | 437 | 0.3 |
| Apr-95 | 1770 | 0.55 |
| Sep-95 | 1760 | 0.65 |
| Apr-96 | 1730 | 0.745 |
| | | |
| Low | 772 | 0.40 |
| Mean | 1196 | 0.52 |
| High | 1620 | 0.64 |
| St. Dev. | 602 | 0.17 |

| | MW-1A Fe | MW-4A Fe | MW-5A Fe | MW-7A Fe | MW-8A Fe | | MW-1A Cr | MW-1A Mn | MW-4A Cr | MW-7A Cr | MW-7A Mn | MW-8A TDS | MW-8A Cr |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1988 | -3.12 | -2.24 | -0.42 | -2.96 | -2.73 | | | 0.005 | | | 0.616 | 341 | |
| 1989 | 3.87 | 3.69 | 3.64 | 4.89 | 4.25 | | 0.0025 | 0.005 | 0.0025 | 0.0025 | 0.55 | 391 | 0.0025 |
| 1990 | -0.69 | 2.11 | 1.25 | 3.14 | -0.02 | | 0.0025 | 0.006 | 0.0025 | 0.0025 | 0.565 | 418 | 0.0025 |
| 1991 | 1.97 | 3.48 | 3.30 | 4.06 | 4.19 | | 0.0025 | 0.006 | 0.0025 | 0.0025 | 0.63 | 424 | 0.0025 |
| 1992 | 1.53 | 3.33 | 2.89 | 4.16 | 3.64 | | 0.0025 | 0.007 | 0.0025 | 0.0025 | 0.735 | 430 | 0.0025 |
| Apr-93 | 1.29 | 2.60 | 2.77 | 3.64 | -0.08 | | 0.0025 | 0.009 | 0.0025 | 0.006 | 0.75 | 454 | 0.0025 |
| Mar-94 | -0.43 | 2.19 | 2.22 | 3.57 | 1.19 | | 0.0025 | 0.009 | 0.0025 | 0.007 | 0.8 | 464 | 0.01 |
| Sep-94 | -0.19 | 2.03 | 1.89 | 3.51 | 1.92 | | 0.0025 | 0.01 | 0.0025 | 0.01 | 0.85 | 465 | 0.011 |
| Apr-95 | -0.29 | 2.48 | 1.95 | 3.71 | 2.48 | | 0.045 | 0.011 | 0.017 | 0.065 | 0.875 | 477 | 0.08 |
| Sep-95 | -0.07 | 2.51 | 1.61 | 3.70 | 1.86 | | 0.05 | 0.035 | 0.02 | 0.075 | 0.95 | 492 | 0.14 |
| Apr-96 | 0.72 | 2.24 | 2.64 | 4.09 | 1.59 | | 0.38 | 0.2 | 0.12 | 0.21 | 1.7 | 809 | 150 |
| | | | | | | | | | | | | | |
| Low | -0.84 | 1.10 | 1.37 | 1.75 | 0.20 | M | 9 | 10 | 9 | 10 | 9 | 10 | 9 |
| Mean | 0.42 | 2.22 | 2.16 | 3.23 | 1.66 | n+1-M | 2 | 2 | 2 | 1 | 3 | 2 | 2 |
| High | 1.68 | 3.34 | 2.95 | 4.71 | 3.13 | low | 0.0025 | 0.005 | 0.0025 | 0.0025 | 0.565 | 391 | 0.0025 |
| St. Dev. | 1.79 | 1.59 | 1.12 | 2.10 | 2.08 | median | 0.0025 | 0.009 | 0.0025 | 0.0065 | 0.75 | 454 | 0.00625 |
| | | | | | | high | 0.05 | 0.035 | 0.02 | 0.21 | 0.875 | 492 | 0.14 |
| | | | | | | | | | | | | | |
| Low | 0.43 | 3.00 | 3.94 | 5.74 | 1.22 | | | | | | | | |
| Mean | 1.52 | 9.21 | 8.65 | 25.25 | 5.27 | | | | | | | | |
| High | 5.36 | 28.22 | 19.01 | 110.97 | 22.78 | | | | | | | | |