State of Wisconsin \ DEPARTMENT OF NATURAL RESOURCES

Carroll D. Besadny
Secretary

BOX 7921
MADISON, WISCONSIN 53707

May 12, 1986

IN REPLY REFER TO: 4430

Mr. Russell L. Cerk
Vice President-Manufacturing
Freeman Chemical Corporation
P.O. Box 247
Port Washington, WI 53074

RE: Interim Remedial Investigations Report, Freeman Chemical Corporation, Saukville, Wisconsin

Dear Mr. Cerk:

We have completed our review of the technical report summarizing the 1985 field investigations at the Freeman Chemical property. We agree with you that remedial actions to address soil and groundwater contamination should be undertaken as soon as possible. Your plan to install the Ranney collectors this spring and move ahead on withdrawal and treatment of contaminated water from the dolomite aquifer is acceptable. This letter describes and reviews the project and contains a number of comments and suggestions on the proposed remedial actions. It is our understanding that Freeman Chemical Corporation, the Department of Natural Resources and the U.S. EPA will work toward a consent agreement under the corrective action provisions of the Resource Conservation and Recovery Act to formally express our mutual agreements regarding the proposed remedial actions.

REVIEW COMMENTS

File Information

The Bureau of Solid Waste Management, Wisconsin Department of Natural Resources, received the report titled "Summary-1985, Interim Remedial Investigations Report, Freeman Chemical Corporation, Saukville, Wisconsin" on March 4, 1986. The report, dated February 28, 1986, was prepared by Hatcher, Inc. of Richmond, Virginia.

Site History

Freeman Chemical Company owns and operates a polyester and urethane manufacturing facility in the City of Saukville, Wisconsin. During the past 37 years of operation spills of raw materials, resins and by-products have

occurred. Waste reaction water ("acid water") has been spilled, leaked from pipelines and disposed of in a seepage pit ("dry well"). In 1979, trace organic chemicals and an "acid water" odor were discovered in the municipal water supply. City Well #2, located approximately 600 feet northwest of the Freeman Chemical property, was found to be contaminated and was removed from municipal use. Freeman Chemical has continued to use City Well #2 as a source of noncontact cooling water. This water is eventually discharged to the Milwaukee River.

The Laubenstein warehouse is located directly west of the Freeman Chemical facility. Over the last several decades, a number of commercial/industrial operations have been located on the Laubenstein property. Northern Signal Company (an electrical parts manufacturer), occupied the warehouse in the 1960s and used trichloroethylene (TCE) for cleaning electrical parts. Sludge from the TCE dip tanks was reportedly disposed of on the plant grounds. TCE (which Freeman Chemical Corporation claims to have never used) was one of the contaminants found in City Well #2. In the early 1970s, Northern Signal Company was purchased by Waters Instruments, Inc. of Rochester, Minnesota and the manufacturing operation was moved to Minnesota. Waters Instruments has supported some of the field investigations done by Freeman Chemical. A 450 foot deep well (cased to 30 feet) exists on the Laubenstein property. This well was used by previous dairy and cannery operations. It was not used by the Northern Signal Company. There is no pump in the well and the well is unprotected at the surface. Geophysical studies show that the well casing is damaged. This condition may allow contaminants in the soil to flow into the well.

In 1983, subsurface investigations were begun to define site geology and hydrogeology and to delineate areas of contamination. These investigations included the Freeman plant, the Laubenstein property, the cemetary to the south, the Logeman Brothers property to the southwest, the church yard to the northeast and the area between the plant and the Milwaukee River. Between September and December, 1983, 49 borings were installed on the Freeman Chemical facility and surrounding area. The borings included the installation of 13 water table observation wells and 3 nested piezometers. In 1985, a number of existing monitoring wells were abandoned or replaced. Four piezometers within the dolomite bedrock, two new water table observation wells and one deep piezometer were installed. In addition, geotechnical studies were undertaken to further define the geologic environment.

Site Description

Topography and Surface Water Drainage. Saukville is located on rolling to relatively flat terrain. The topography is a result of the bedrock configuration and glacial deposition/erosion. Freeman Chemical is located near the west bank of the Milwaukee River. The land surface slopes from west to east toward the river. Surface water drains from the plant grounds and flows, via storm sewers, to the river. The Bureau of Waste Water Management is requiring Freeman Chemical to collect and treat stormwater runoff prior to discharge. A large portion of the facility grounds will be paved to facilitate stormwater collection. Freeman's proposed surficial groundwater collection systems would have to be in-place prior to initiation of the stormwater control program.

Geology. Glacial till and glaciolacustrine and glaciofluvial deposits overlie dolomite bedrock at Saukville. Unconsolidated deposits range from approximately 10 to 25 feet in thickness. In general, sand, silt, and clay are present near the land surface and overlie a laterally continuous layer of lake sediments (varved silts and clays). Dense glacial till exists beneath the lacustrine deposit in the north and east portions of the property. Beneath the till/lacustrine deposits is a thin layer of glacial outwash over the bedrock surface.

Soil borings and seismic refraction surveys show the bedrock surface at the site to be pinnacled with occasional deep, narrow closed depressions (possibly sink holes). A deep depression in the bedrock, filled with more than 150 feet of clay, silt and sand, was encountered in the northwest corner of the Freeman property. A bedrock high occurs near the center of the Freeman Chemical property. At four locations, the dolomite was cored to a depth of 65 to 85 feet. The cores show that the dolomite is severely solution and highly fractured.

Hydrogeology. The water table is located approximately 5 to 12 feet below the land surface at the facility. The water table, which is in the unconsolidated materials, follows the slope of the topography and flows east and southeast toward the Milwaukee River.

The dolomite aquifer is semi-confined by the surficial glacial/lacustrine materials. As measured in the summer of 1985, a groundwater high in the bedrock existed in the west central portion of the Freeman facility, corresponding to the bedrock high. Groundwater in the dolomite aquifer flows in every direction away from this high. However, flow in the dolomite is predominantly west (toward the Laubenstein well), northwest (toward City Well #2), and east/southeast (toward the Milwaukee River). Location of a divide through the western third of the Freeman facility is apparently controlled by pumping City Well #2. A "cone of depression" exists at the Laubenstein well, even though it is not pumped. This cone appears to be caused by the pumping of City Well #2. A dolomite piezometer (Well #22) was installed between City Well #2 and the Laubenstein well. When City Well #2 is pumped, the water level in the Laubenstein well falls 20 to 30 feet while there is only a small response in water levels at monitoring well #22. This indicates that the Laubenstein well and City Well #2 may be connected by one or more solution channels.

Groundwater Quality. The site studies have identified a number of potential sources of groundwater contamination on the Freeman site. These are detailed in Figure 17 of the report. Soil samples collected during the soil boring and monitoring well installation program were routinely sniffed and given a qualitative odor classification. The highest levels of soil contamination (judged by odor tests) were found:

1. At the tank farm in the central area of the facility.

2. In a churchyard, northeast of the site where previous spills have occurred.

3. Along the southwestern property line near a barrel storage area.

4. At the site of the abandoned dry well.

5. North of the truck scales where solvent containers are located.

Diffusion and shallow groundwater movement has carried the contaminants away from these central sources so that some soil contamination is found at most of the Freeman facility and off the property to the northeast and southwest.

Groundwater quality sampling has been done quarterly for two years. Much of the early sampling data is of limited use because:

1. Several shallow bedrock piezometers were screened between the bedrock and surficial soils so that water quality in these wells was a mix of the two systems. Newly constructed piezometers were sampled in November, 1985.

2. Laboratory methods in early 1984 did not separate trichloroethylene (TCE) from trans-1, 2-dichloroethylene (DCE). High levels of TCE were originally reported at the Freeman plant, but subsequent testing by another laboratory showed that DCE was the actual contaminant present. In May, 1985, TCE was detected at two wells on the Freeman property - a well near the tank farm (370 ppb) and a well near the old dry well disposal area (42 ppb). Both of these wells were partially screened in the dolomite. All other TCE detections in 1985 were on the Laubenstein property.

Based on groundwater data, solvent concentrations are highest in the glacial materials. The sum of VOCs in the shallow water table is approximately: 400,000 ppb near the tank farm, 150,000 ppb near the dry well, 28,000 ppb near the truck scales, 32,000 ppb near the southwest barrel storage area, and 4,500 ppb south of the Laubenstein warehouse.

Contamination in the shallow dolomite appears to be more widespread, but of lower concentration than the glacial materials. The sum of VOCs in the upper dolomite (upper 100 feet) is approximately: 2,100 ppb at the Laubenstein well, 4,600 ppb northeast of the tank farm and 200 ppb at the barrel storage area. Lower concentrations of contaminants were also found near the south property line and at unused private water supply wells northeast of the Freeman facility.

Contaminants have also been detected in the deep dolomite aquifer (100 to 500 feet below the land surface). A packer was placed in the Laubenstein well to isolate the upper 100 feet. The lower portion of the well was then pumped at 50 gpm for five days. TCE was consistently detected at about 12 ppb throughout the test, indicating that contaminants have spread through the deep dolomite. City Well #2 has, until late 1985, shown trace levels (usually less than 1 ppb) of TCE and occasionally, other contaminants.

Most contaminated groundwater samples (from the water table, upper and deep dolomite) also exhibit an "acid water" odor. The odor is found in both the Laubenstein well and City Well #2. This odor (which apparently originates from Freeman's reaction water) is likely due to organic chemicals which have not been quantified in this study.

Proposed Remedial Actions.

Freeman Chemical Corporation proposes a three-tier remedial action program to address contamination in the surficial glacial materials, the upper dolomite and the deep dolomite aquifer. As proposed, all remedial measures would be placed on the Freeman property and in the church yard.

Three Ranney collector systems would draw contaminated water from the glacial soils to central collection points. These systems, similar to a series of French drains, would consist of gravel-filled trenches approximately 15 feet deep (near the top of the bedrock) with a collection pipe at the bottom of the trench. Collected groundwater would gravity drain to a central manhole, where it would be pumped to an air stripper for removal of VOCs. Effluent from the air stripper would be discharged to the Village of Saukville wastewater treatment plant (WWTP). It is estimated that 8 gpm would be collected by the three systems.

A series of four to six-inch diameter withdrawal wells would be installed in the upper dolomite. Groundwater would be pumped to a second air stripper and then to a reservoir to be mixed with water from the deep dolomite. This water would be used as noncontact cooling water for plant operations.

Contamination of the deep dolomite would be addressed by the installation of one or more deep dolomite withdrawal wells on the Freeman property. It is proposed that City Well #2 (used exclusively by Freeman) and City Well #1 (a municipal water supply well) be taken out of service. City Well #3 (on the east side of the Milwaukee River) would be repaired by Freeman Chemical and replace City Well #1. The proposed changes to the municipal water supply are subject to approval by the Village of Saukville and the Department of Natural Resources.

Freeman Chemical proposes not to repair or pump the Laubenstein well because they do not own the property and are not responsible for the presence of TCE. However, contaminants from the Freeman property have the potential to move toward the Laubenstein well. The Laubenstein well appears to be a direct and continuous source of contamination to the bedrock aquifer because of the damaged well casing. The hydraulics of the Laubenstein well suggests that pumping it may be the most efficient way of removing contaminants from the dolomite aquifer.

In addition to the groundwater clean-up program, Freeman Chemical proposes to eliminate potential contamination sources by excavation, plugging, paving and reconstruction techniques. These include:

1. Removal of buried and unused tanks.

2. Exhumation and sealing of the old dry well area.

3. Reconstruction of all floor sumps.

4. Removal and reconstruction of the tank farm and removal or flushing of all buried raw material pipes.

5. Paving of active areas of the plant and a comprehensive surface water control program.

6. Construction of an enclosed truck unloading facility.

7. Locating and sealing an old farm well on the property.

Comments

We commend Freeman Chemical Corporation and their consultant, Hatcher, Inc., on performing a thorough investigation of the hydrogeologic environment at the plant grounds in Saukville. The study has delineated areas of surficial soil contamination and shallow and deep bedrock contamination and proposed appropriate remedial action measures. It is in Freeman's interest to implement the remedial actions as soon as possible.

Environmental Permits Required. We want to facilitate the proposed remedial action by helping you obtain the air, water supply and wastewater approvals necessary for operating the groundwater treatment and disposal systems. These approvals will require the submittal of specific engineering plans, applications, descriptions or other information to EPA and the Bureaus of Waste Water Management, Air Management, Water Supply and Solid Waste Management. The following table provides a brief description of the required approvals and persons to contact and should be of aid to you.

Ranney Collection Systems. The Ranney collection systems should be installed during spring to early summer of 1986. Installation will require close engineering supervision to ensure that the trenches remain above the bedrock surface and gravity drainage is maintained. Due to the uneven bedrock surface, you may encounter bedrock during trench construction. If the bedrock is rippable, it should be removed and clay recompacted on the bedrock base and sides to seal the trench from the dolomite. Any free water entering the trench from the bedrock should be collected and stored for subsequent treatment/disposal. If the bedrock is not rippable, consideration should be given to rerouting the collection trench.

We are recommending that a groundwater monitoring system be established to determine the effectiveness of the Ranney collector system. This will entail installing additional monitoring wells in the glacial materials near the truck scale, tank farm, church yard, and tanker parking areas. Exact location of these wells should be chosen after installation of the Ranney collectors. Water quality testing of all groundwater collection and treatment systems should continue through the life of the remedial action program.

Dolomite Aquifer Restoration. A deep dolomite extraction well on the Freeman property would have to be 450 to 480 feet deep (the depth of the Laubenstein well and City Well #2, respectively). This well will be necessary to supply Freeman's noncontact cooling water if City Well #2 is decommissioned. The new well would also serve as part of the clean-up program. However, we would encourage you to fully explore the option of using the Laubenstein well in the aquifer restoration program. The hydraulics of the Laubenstein well are fairly well known, and this well may be best situated to effectively remove contaminants from the dolomite aquifer. In addition, the damaged casing at the Laubenstein well provides a conduit for surficial contaminants to reach

TABLE

Regulatory Requirement or Approval	Type of Submittal	Applicable Limits/ Conditions	Contact Person(s)
HSWA 3008(h) Order	Description of program; this letter	Negotiated; see this letter	Rick Karl - EPA (312) 886-4448
Sec. 144.04 Plan Approval/ POTW Discharge System	Plans and specs Air Stripper system discharging to POTW	Specified in the 144.04 plan approval letter	Robert Steindorf Municipal WW Section (608) 266-0449
POTW Discharge Limits/ Approval	Description of discharge H_2O quality/quantity	See NR 211; also Village of of Saukville can impose limits	Chuck Schuler Pretreatment Section (608) 267-7631; Village of Saukville
Sec. 144.04 Plan Approval/ River Discharge	Plans and specs Air Stripper system discharging to river	Specified in the 144.04 plan approval letter	Brian Barbieur IWW Section (608) 266-0232
River Discharge Limits/ Approval	WPDES permit modification or new application	Based on water quality standards	Brian Barbieur IWW Section (608) 266-0232
VOC/Odor Emissions Limits/Approval	Plans and specs for all air strippers, description of emissions	Permit required for more than 3 #/hr or 15 #/d of VOC emissions; may be others	Dale Ziege Bureau of Air Mgt. (608) 266-0113
High Capacity Well Permit	Application including well locations, pumpage rates, installation details, water levels and well abandonment details	Required for any system discharging a total of 70 GPM or more	Bill Furbish Private Water Supply (608) 266-0153 Ted Bosch - SED
Village Water Supply Changes Approval	Plans and specifications for any changes	Specified in plan approval letter; based on water needs	Lee Boushon Public Water Supply (608) 266-0857; Village of Saukville; Ted Bosch - SED
Contaminated Soil Management	Description of Management Methods (Recommendation #12)	See Ch. NR 181	Richard O'Hara (608) 266-0833

NOTE: All approvals/permits are required before construction is initiated for any of the systems, with the exception of the EPA 3008(h) order.

Key: HSWA - 1984 RCRA Amendments
IWW - Industrial Wastewater Section
POTW - Publically Owned Treatment Works
VOC - Volatile Organic Compounds
WW - Wastewater

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the dolomite aquifer. This contaminant source should be addressed, either by repairing the Laubenstein well or by abandoning it altogether.

We recognize that Freeman Chemical Corporation does not own the Laubenstein property and may not responsible for the TCE found on the property. However, given the cost and uncertainties of installing a new deep dolomite well, it appears to be in your interest to negotiate the use of the Laubenstein well. We strongly urge you to pursue this option with the current owner and Waters Instruments, Inc. We understand that U.S. EPA has the authority to require you to take clean-up action beyond the boundaries of your property.

Miscellaneous. Several items came to our attention during review of the Interim Remedial Investigation Report. These comments are provided to help you in subsequent submittals.

1. Well construction logs are needed for each well installed at the facility. "Typical" well construction diagrams (such as Figure 4 and 5) are not sufficient. You should submit well logs for all functioning monitoring wells on the Freeman and Laubenstein properties. All wells installed in the future should be documented with soil boring and well construction logs.

2. A site topographic map should form the "base" for all subsequent plan views of the facility. Ten different scales were used to present maps in the report and this made comparison of the maps very difficult. The topographic map should be at a one-inch to 100-foot scale with a maximum 2-foot contour interval and indicate the property boundaries, survey grid and north arrow, homes, buildings, water supply wells, utility lines, man-made features, soil boring and observation well locations and other pertinent information.

3. The report mentions that in-field permeability tests were conducted on monitoring wells at the facility, but no data or data analysis of this information was presented in the report.

4. All previous water quality data (particularly that from February and May, 1985) should have been included in the report, even though a number of wells have been abandoned or replaced.

5. Geologic cross-sections should contain actual soil and rock descriptions. Interpretation of geologic origin can then be superimposed on the cross-section.

6. Estimates of leakage from the surficial glacial materials to the dolomite aquifer appear to be low. We have used the Thornthwaite and Mather water balance method and estimated an infiltration rate of approximately 7.4 inches per year or about 7,000 gpd over the affected 12-acre area. This estimate indicates that the bulk in-field permeability of the glacial materials is approximately 1.5×10^{-6} cm/sec, rather than the 1×10^{-7} cm/sec used in your calculations.

RECOMMENDATIONS

The Department finds the proposed remedial action program for the Freeman plant in Saukville, Wisconsin, acceptable and makes the following recommendations:

General

1. Freeman Chemical Corporation should obtain all required environmental permits prior to operation of the remedial action program. These permits may include, but are not limited to, approvals from the Bureaus of Water Supply, Waste Water and Air Management. Freeman Chemical should also obtain all other applicable permits or approvals. At least two copies of all permit applications should be submitted to the Bureau of Solid Waste Management in addition to permit applications submitted to other bureaus or offices.

2. The remedial action program should be implemented as soon as possible, but no later than:

Date	Activity
1 June 1986	Begin construction of Ranney collector trenches.
1 July 1986	Installation of shallow dolomite wells completed.
1 August 1985	Installation of deep dolomite well and Ranney collector system completed.
1 October 1985	Potential contaminant sources eliminated as outlined in section 6.2.
1 January 1987	Full remedial action program operational.

Please let us know if there will be any significant delays to this schedule.

3. Freeman Chemical Corporation should take the necessary actions required to stop seepage of contaminants from the soil and shallow dolomite into the Laubenstein well. Proposals for remedial action on the Laubenstein property should be submitted to the Department for review.

Site Construction Documentation

4. A site construction documentation report, verifying and documenting all aspects of the program should be prepared and submitted following installation of the complete remedial action program. The report should include, at a minimum, the following information:

   a. A plan sheet, or sheets, documenting the location of the Ranney collector trenches and man holes, groundwater monitoring wells, spot elevations of the base of the trenches, and location of pipes interconnecting the withdrawal systems. The plan sheet(s) should be based on a 1-inch to 100-foot scale (or less) topographic map with maximum 2-foot contour intervals and indicate the property boundaries, survey grid and north arrow, homes, buildings, water supply wells,

utility lines, man-made features, soil boring and observation well locations and other pertinent information.

b. A comprehensive narrative explaining how construction of the project was accomplished along with an analysis of data obtained from testing the collection and treatment systems. This report should include an appendix containing all of the raw data from field and laboratory testing work.

c. Documentation of the remedial actions taken to eliminate potential sources of contamination, including: removal of unused/buried tanks, exhumation of the "dry well", reconstruction of floor sumps, removal and reconstruction of the tank farm, surface water control measures, construction of the enclosed tank unloading facility, and location and removal of the old farm well.

d. A series of 35 mm slides or color prints documenting all major aspects of the remedial action program.

5. At any point at which the Ranney collection trenches intercept the bedrock, the bedrock should be removed. The bedrock sidewalls and base should be sealed from the trench by grouting or recompacting clay. Documentation should include methods used to remove bedrock, store and treat contaminated water, and seal the bedrock from the trench.

6. Groundwater handling and treatment systems should be documented, including location and capacity of storage, details of the air stripping towers, and treated water discharge locations.

7. Well construction and soil boring logs should be submitted for all discharge wells used in the remedial action program. The narrative should include expected volumes of water pumped from each well and results of any pump tests conducted on the wells.

Groundwater Monitoring

8. Freeman Chemical Corporation should monitor the following points within 15 days of March 15, June 15, September 15 and December 15 of each year for volatile organic chemicals and odor:

Municipal Well No. 1	PZ - 6A	W - 21
Municipal Well No. 2	PZ - 7	W - 22
Private Well No. 3	PZ - 8	W - 23
Laubenstein Well	PZ - 14A	W - 24
PZ - 1A	PZ - 19A	W - 25
PZ - 4A	PZ - 27	

All deep and shallow discharge wells. Each central manhole in the Ranney collectors. All new groundwater monitoring points.

9. To monitor the effectiveness of the Ranney collector systems, at least five additional shallow wells should be installed in the glacial soils, above the bedrock. These wells should be placed near the truck scale, tank farm, church yard, and tanker parking areas. Freeman Chemical should submit proposed locations for these wells to the Department after the

Ranney collector systems are installed. The new monitoring wells should be installed within 30 days of Department review.

10. Well construction logs should be submitted for all functioning monitoring wells on the Freeman and Laubenstein properties. All wells installed in the future should be documented with soil boring and well construction logs.

11. Results of all water quality monitoring for the remedial action program required by the Bureau of Waste Water Management or the Village of Saukville should be submitted to the Bureau of Solid Waste Management with the quarterly groundwater monitoring results.

Other

12. Freeman Chemical corporation should characterize contaminated soils removed from the Ranney collector trenches (and generated from other remedial activities) and propose a method(s) to manage this material. Department approval should be obtained for treatment and/or disposal of soil from the Freeman plant. During construction, contaminated soil should be stockpiled in one area on the Freeman plant grounds and covered to avoid contact with precipitation.

13. An annual report should be submitted by June 1 of each year advising the Department of the project to date, summarizing the data collected during the year, and suggesting future actions, where appropriate. The annual report shall, at a minimum, include: An evaluation as to the effectiveness of the Ranney collectors, shallow bedrock withdrawal wells and deep bedrock withdrawal well(s); volume of groundwater collected and treated during the year; a summary of groundwater quality; and a summary of water quality entering and leaving at the treatment system.

14. Freeman Chemical Corporation should proposed a contingency plan for providing uncontaminated noncontact cooling water during scheduled maintenance or breakdown of the groundwater treatment system.

15. Details for removing and/or correcting other potential contaminant sources (section 6.2 of the report) on Freeman's property should be submitted for review by the Department.

CONCLUSION

We are very pleased with the effort Freeman Chemical Corporation has put forth in working to resolve the groundwater contamination problem in Saukville. We hope that the planned remedial actions will go forward this summer and that the RCRA consent order will be settled in a timely fashion. We expect to work closely with you throughout implementation of this plan.

If you have any questions, please call Terry Evanson at (608) 266-0941, Gary Edelstein at (608) 267-7563 or Rich O'Hara at (608) 266-0833.

Sincerely,

Richard E. O'Hara

Richard E. O'Hara, Chief
Hazardous Waste Management Section
Bureau of Solid Waste Management

REO/cn

cc: Cindy Slavik - SED
Ted Bosch - SED
Ken Weisner/Brian Barbieur - WW/2
Linda Wymore - LC/5
Roger Hatcher/George Bain - Hatcher, Inc.
Jean Nichol - Freeman Chemical
Kevin Brunner - Village of Saukville
Daniel Butler - Ruekert & Mielke, Inc.
George Waters - Waters Instruments
Paul Landry - Fredrickson & Byron, P.A.
Viet Ngo - EWA
Paul Schaefer, Plant Manager - Freeman Chemical
Jim Schmidt - WR/2
Lee Boushon/Bill Furbish - WS/2
Don Theiler/Dale Ziege - AM/3
Rick Karl - EPA Region V
Systems Management Section - SW/3

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