
PROCEDURES FOR ESTABLISHING
A REGIONAL SEWER BILLING FORMULA

1. Review of Existing Billing Procedures and Use of Exhibit J of the Regional Sewage Service Contract.

Each agency provided information relative to current billing procedures and capital fee assessments based on fixture unit counts as determined by Exhibit J. A review of the information indicated that the use of Exhibit J for monthly/bi-monthly sewer billing purposes was not accurate. The calculated equivalent dwelling units (EDU's) in the Exhibit J formula did not match the actual flows that were being discharged by the various commercial categories. Please keep in mind that actual flows of the various commercial categories were determined from user accounts that had separate meters for domestic and landscape water use, thus an accurate determination of discharge flows were able to be obtained.

The fluctuation between calculated EDU flows (Exhibit J) and flows based on actual metered consumption varied substantially from category to category. Even users within the same category that had the same number of EDU's had consumption and discharge flows that varied substantially. It was determined that the Exhibit J formula did not consider actual flows therefore the formula should not be used for determining sewer billing EDU's.

2. Formula Format for New Billing Procedure.

A determination was made to utilize as much of the existing formula format as possible. As can be seen by the work sheet (Exhibit A) and the finished table (Exhibit B), this was accomplished by using the Category and Type of Commercial columns, the BOD/SS column, a factor column and utilization of the Sewage Factor formula for determining the BOD/SS impacts. The flow portion of the formula was converted to a percentage of metered consumption.

3. Category and Type of Commercial Columns

These columns were initially established based on similar types of activities and water use. The Type of Commercial column was modified slightly after BOD/SS strengths had been established and sewage discharge characteristics were reviewed. The intent of each category is to combine similar uses and BOD/SS loadings. This will enable different individuals to categorize their various commercial users in the same manner.

4. Established Biological Oxygen Demand (BOD) and Suspended Solids (SS) for Each Category.

Each agency provided information relative to BOD/SS strengths for the various categories that the agency had acquired through its own testing program and through analysis reports submitted by the commercial users. In addition Chino Basin provided commercial user strength characteristic tables from EPA and from the State Water Resources Control Board. During review of the BOD/SS strengths it was found that the original strengths used in Exhibit J appeared to be low. With this information BOD/SS strengths were established for each category of commercial user. Please refer to the attached Exhibit C for the appropriate BOD/SS strengths. In applying the higher BOD/SS strengths to Categories 2,3 and 8 it was determined that the substantially higher strengths caused substantial increases in the sewer rates for those categories. To lessen the impact it was determined to reduce the BOD/SS for Categories 2,3 and 8. The strengths will be reviewed on an annual basis by the Regional Program and implemented as determined by the agencies. The modified strengths are as shown on the finalized work sheet.

5. Discharge Flow Percentage Factor

All commercial users have meters that monitor water consumption. A portion of the consumption is returned to the sewer through either process or user discharge. The amount of discharge to the sewer for each type of user within the category is reasonably typical. Therefore based on information that each agency had developed over the years, percentage of consumption factors were established for each category. These factors represent the amount of consumed water that is returned to the sewer. The established percentage factors are based on metered flows that are for domestic purposes only.

For all metered consumption that have a combined domestic and landscape usage, a factor of 55% is used to determine the domestic portion of the metered consumption. Please refer to item 9 below for applying discount percentage factors to the combined consumption meter readings.

6. Service Unit Formula (SU)

The sewer billing system is based on the assumption that one EDU is equivalent to one residential unit. One residential unit discharges 270 gallons per day of sewage with a BOD of 230 and a SS of 220. The SU formula is used to convert the BOD/SS loadings of various commercial users to an equivalent amount of residential units. The Service Unit Formula is as follows:

$$SU = \frac{\text{Flow}}{270} (0.37 + 0.31 \frac{\text{BOD}}{230} + 0.32 \frac{\text{SS}}{220})$$

Formula History

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The SU formula was applied to each of the categories to determine the numerical equivalent of a residential unit. These numerical equivalents are indicated in the Service Units column of the work sheet (Exhibit A). The flow factor in the formula is the portion of metered usage attributable to the sewer discharge.

7. Flow Conversion to Hundreds of Cubic Feet (HCF)

The SU formula is based on gallons per day (gpd) of sewer discharge (one residential unit equals 270 gpd). All agency meter readings are based on hundreds of cubic feet (HCF) of water consumption. One HCF is the equivalent of 748 gallons of water. Some agencies bill customers on a monthly basis, other agencies bill customers on a bi-monthly basis. In order to establish a sewer billing formula based on metered consumption a conversion from gpd to HCF has to be made. The following is how the conversion was made for both monthly and bi-monthly:

Conversion to HCF (Hundreds of Cubic Feet):

$$\text{Bi-Monthly} = 270 \text{ gpd} \times 365 \text{ days} \div 748 \div 6 \text{ months} = 21.96$$

$$\text{Monthly} = 270 \text{ gpd} \times 365 \text{ days} \div 748 \div 12 \text{ months} = 10.98$$

These two numbers represent the equivalent daily discharge over a one or two month period as measured in HCF. These numbers are then carried forward in the equation as indicated on the work sheet.

8. Equivalent Dwelling Unit (EDU) Calculation and Formula

The next step in the process is to compile all the information and conversions into the original formula. The EDU calculation column on the attached work sheet accomplishes this. The flow percentage factor is multiplied times the meter reading in hundreds of cubic feet (HCF) which is multiplied by the numerical equivalent residential units (service unit formula) and that is divided by the equivalent discharge for either monthly or bi-monthly billing converted to HCF.

$$\text{EDU's} = \text{Flow \%} \times \text{HCF} (0.37 + 0.31 \frac{\text{BOD}}{230} + 0.32 \frac{\text{SS}}{220}) \div 10.98 \text{ or } 21.96$$

* Add landscape factor if applicable

$$\text{Sewer Bill} = \text{EDU's} \times \text{Agency EDU billing rate}$$

The last columns in the work sheet represent the resultant factor of the formula calculation with the HCF being the only unknown that is entered when the meter is read by the agency. This decimal factor multiplied by the metered consumption will provide the number of equivalent dwelling units which is then multiplied by the agency's cost per EDU to determine the customers sewer bill.

Formula History
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Please note that these formulas for the various categories are to be used for all metered accounts that provide only domestic water service. If the metered account has combined domestic and landscape usage please refer to item 9 below.

9. Combined Domestic/Landscape Usage

If an account has combined domestic and landscape usage in the HCF metered consumption reading then the HCF reading shall be multiplied by 55% (.55) prior to the EDU's being calculated in the formula. 55% represents the amount of consumption that is contributable to the domestic consumption. If an account has a special circumstance and can show that the landscape usage is different than the norm established above, that account can be so adjusted providing the billing agency documents the change in the landscape factor and can provide that information to the auditor if required.

10. Category 9 - Sewer Billing for Schools

Each contracting agency provided information on how they bill schools for sewer service. Records indicate that the K through 12 grades are very similar in their domestic water use habits and demands. Records indicated that the average use per student was approximately five (5) gallons per student per day. The one college indicated a usage of approximately ten (10) gallons per day per student. All of the information was reviewed and from that review it was determined to bill schools for sewer service based on a gallon per day (gpd) discharge per student. It was also noted that an accurate student count is obtained by each school during the month of October and this number is reported as the school's October Average Daily Attendance or October ADA.

Therefore to calculate a K thru 12 school sewer bill perform the following:

October ADA multiplied by 5 gpd divided by 270 gpd = EDU's

The EDU's are then multiplied by the agency's monthly or bi-monthly sewer rate and that amount is then billed to the school throughout the year. Each October a new student count is obtained and a new rate is determined. For a college use the same procedure except 10 gpd is used.

EFFECTS OF FORMULA ON DISTRICT COMMERCIAL USERS

CATEGORY 1

Financial Impact - a reduction in sewer bills from 16% to 20% depending on the amount of water discharge to the sewer.

This category includes all the general commercial users who do not have or are associated with food services of any kind. These users are mostly domestic waste dischargers only.

CATEGORY 2

The District has no accounts in this category.

CATEGORY 3

Financial Impact - an increase in sewer bills from 15% to 21% depending on the amount of water discharge to the sewer.

This category includes all commercial users who have food as part of their service but not as their only service. This category also includes hospitals and convalescent homes. The major reason for the increase is due to the BOD/SS loadings.

CATEGORY 4

Financial Impact - a reduction in sewer bills from 28% to 46% depending on the amount of water discharge to the sewer.

Both users are subject to permitting and installation of clarifiers to reduce constituent loadings and this is reflected in the low BOD/SS numbers and the removals of other constituents.

CATEGORY 5

Financial Impact - an increase in sewer bills from 5% to 10% depending on the amount of water discharge to the sewer.

The District only has dry cleaners. These users will see a small increase due to the increase in the BOD/SS numbers. Water consumption is very small so the impact will be minimal.

EFFECTS OF FORMULA ON DISTRICT COMMERCIAL USERS

CATEGORY 6

Financial Impact - a reduction in sewer bills from 23% to 36% depending on the amount of water discharge to the sewer.

The District has no motels and only two or three health spas. The majority of those impacted are the churches and the reduction is due the difference in this Districts current billing system.

CATEGORY 7

Financial Impact - a reduction in sewer bills from 22% to 35% depending on the amount of water discharge to the sewer.

The major reason for the reduction is due to the difference in this Districts current billing system.

CATEGORY 8

Financial Impact - an increase in sewer bills from 14% to 20% depending on the amount of water discharge to the sewer.

This category includes all users who have food as a major part of their service and therefore have a greater impact. In this category the EDU Committee has reduced the BOD/SS loadings by 50% because of the impact to the user. Normal loading factors should be 800/600. It is proposed to increase the loadings over the years to comply with what the norm should be.

CATEGORY 9

Financial Impact -
Elementary Schools - 136% increase in sewer bills
Jr. High Schools - 18% increase in sewer bills
High Schools - 42% decrease in sewer bills
Colleges - 17% increase in sewer bills

Elementary Schools - during the review process the school water usages and the number of students were compared and it was realized that the District has been dramatically under billing the elementary schools. The actual amount of water per student per day that is discharged to the sewer is greater than what has been billed. I would propose that the increase in fees be made up over a period of 4 years. Bi-monthly bill increases range from \$220 to \$400 depending on the number of students if the entire 136% were applied at one time.

Jr. High Schools - Here again the investigation indicated that these schools were being underbilled but not as severe. The increase is proposed to be billed with no time for make up.

**EFFECTS OF FORMULA ON
DISTRICT COMMERCIAL USERS**

High Schools - The District originally had high schools grouped with the one college, but in the review process it was determined that their flow discharge is very similar to that of the Jr. High therefore there is a substantial reduction in the sewer rate.

Colleges - The District is the only agency with a college. Originally the college and high school were grouped together but because the college has full time night school activities the discharge per student increases because of the extra 7 hours of daily operation. The increase is reflective of this operational difference.

**CHINO BASIN REGIONAL SEWER SERVICE PROGRAM
 Volumetric Equivalent Dwelling Unit (EDU) Calculation
 Industrial Users**

1. Industrial: Shall be defined for purposes of this exhibit, as those industries identified in the Standard Industrial Classification Manual, Bureau of the Budget, 1967, as amended and supplemented, under the category "Division D – Manufacturing" and such other classes of significant waste product as, by regulation, the Administrator deems appropriate. EDU's shall be determined as follows:

$$\text{Total EDU's} = a + b$$

- a. Domestic Wastewater EDU's are calculated using Category #1 on Table 1.
- b. Non-domestic Wastewater EDU's are calculated as follows:

<u>Non-Domestic Flow</u>	(0.37 + 0.31 <u>BOD</u> + 0.32 <u>SS</u>)
270	230 220

2. Procedures for establishing industrial wastewater strength charges shall be as follows:

- a. If required by the Contracting Agency, any Non-residential User may be required to submit on a yearly basis (on or before the first of July of every year), a 24-hour composite wastewater analysis performed by a certified laboratory. Said analysis shall be for BOD, SS and/or any other parameter as may be required by Contracting Agency Ordinance. The results of this analysis may be used to adjust the equivalent dwelling units for any category of the Non-residential User. The frequency of wastewater analysis samples submitted may vary depending on the type of industrial discharge as determined by the Contracting Agency.

- b. In the event the User believes the BOD, SS, and sewer factor assigned in this Section is no longer applicable, said User may submit the results of a laboratory analysis of its wastewater from a certified laboratory to the Agency for review. An adjustment may be made if deemed appropriate and consistent with the intent of this Section.
 - c. If a pretreatment wastewater device and/or in-plant modification is instituted which involves a change in the quality and/or quantity of wastewater being discharged, the User shall immediately after instituting their new program have the effluent from the industrial plant reanalyzed as described in Section 2.a.
 - d. All monitoring and laboratory work must be arranged and paid for by the Non-residential User.
3. The specific wastewater rate calculation criteria, to include the assignment of sewer factors to specific Users, shall be determined by the Contracting Agency for all Users not specifically mentioned under the classifications set forth in this section, in accordance with the provisions of this Section.

INDUSTRIAL BILLING **IMPLEMENTATION GUIDELINE**

The purpose of this guideline is to provide specific procedures each Contracting Agency should follow to insure that each Agency implements the industrial billing procedures in a manner that is consistent throughout the Regional Program. The following procedures should be used when determining a new industry's billing or when adjusting an existing industrial billing account.

1. **Users having only Domestic Wastewater Discharge** – If the User has no process wastewater discharge, EDU's are to be computed as follows:
 - a. The rate used to compute EDU's is the same rate used for Commercial Users under Category #1 of the Commercial Users' Table 1. If the User has a dual meter system (one for domestic and one for landscape), the Category #1 factor is applied directly to the domestic metered consumption.
 - b. If all consumption is combined through one meter, and it is verified that the User has landscape use, water consumption could be reduced by 25% to account for the landscape use. The remaining 75% would be applied to the Commercial Category #1 factor in computing the EDU's associated with the domestic discharge. The Contracting Agency is responsible for identifying and retaining documentation supporting the User having landscape water consumption.

2. **Combined Domestic and Non-Domestic Wastewater Discharge** – EDU's are computed based upon water consumption. Water consumption may consist of water used for non-domestic, domestic, and, landscape use. Since the User does not maintain separate metered consumption for domestic versus non-domestic use, the EDU computation requires special computations. Accordingly, the following guidelines should be used:
 - a. Domestic EDU's are computed by multiplying the number of employees by 20 gallons per day and dividing the result by 270 gallons per day. The number of employees should be reviewed on an annual basis and updated if warranted. The Contracting Agency is responsible for identifying and retaining documentation supporting the number of employees.
 - b. If the User does not have a separate meter for landscape use, total water consumption may be reduced by 25%, providing the Contracting Agency verifies the User uses water for landscape purposes. The Contracting Agency is responsible for identifying and retaining documentation supporting the User having landscape use.

The 25% factor will be considered a uniform rate reduction. Should a User protest the 25% factor, a factor change should not be considered other than to recommend the User have a separate meter installed for landscape purposes.
 - c. In computing non-domestic wastewater EDU's, there are two potential options for identifying water consumption associated with non-domestic use that is to be used in the formula described in Section 1(b):
 - i. Non-domestic wastewater EDU's are computed by considering total water consumption as non-domestic wastewater in the formula described in Section 1(b), water consumption used for domestic and landscape purposes are disregarded; or,

- ii. Non-domestic wastewater will need to be computed by reducing total water consumption by water consumption associated with domestic and, if applicable, landscape use. Domestic wastewater is computed as described in item 2(a) and landscaping water use is computed as described in item 2(b) above. The computed non-domestic wastewater would then be used in the formula described in Section 1b in order to compute the EDU's associated with non-domestic use.

In addition, the computed non-domestic wastewater may be further reduced by water consumption that stays with the end product. The User is required to furnish documentation that supports such average monthly product water consumption.

- d. For non-domestic wastewater EDU calculations, the Contracting Agency will be responsible for determining the User's constituent loading that is entered into the formula described in Section 1(b) and shall maintain this information on file for auditing purposes. The constituents shall be monitored at least once a year, more frequent if required, to insure that the User's EDU's are being computed properly.

Issues to Resolve with Technical Committee Members:

1. Should this new industrial rate calculation procedure be required for existing Users? Based upon the response, the first paragraph above would need to incorporate such understanding. As it is, we are saying it only applies to new Users or Users who are undergoing some other sort of adjustment.
2. Based upon decision of a factor reduction for landscape, should we also use the same method for the Commercial Users?

REGIONAL SEWAGE PROGRAM
**SEWER SERVICE BILLING PROCEDURES FOR
RESIDENTIAL AND COMMERCIAL CATEGORIES
BASED ON EQUIVALENT DWELLING
UNIT (EDU) COMPUTATIONS**

General

Equivalent Dwelling Unit (EDU) is a numerical value designation where 1 EDU represents the sewage flow from a single family residential household and is equal to 270 gallons per day discharge with a BOD of 230 mg/l and a SS of 220 mg/l. The following computations shall be used to determine EDU's for residential and commercial units:

Residential: Each structure or part of a structure which is designed for the purpose of providing permanent housing for one family or tenant shall be calculated as follows:

Single Family	1 EDU
Multiple Family	
Apartment	0.7 EDU
Townhouse	0.7 EDU
Condominium	0.7 EDU
Mobile Home	0.7 EDU
Trailer Space	0.7 EDU

Commercial: All structures designed for the purpose of providing permanent housing for enterprises engaged in the exchange of goods and services. EDU's shall be determined by multiplying the metered water usage in hundreds of cubic feet (HCF) by the appropriate Category factor from Table 1.

TABLE 1**SEWER EDU DETERMINATION
FOR COMMERCIAL CATEGORIES**

Category	Type of Commercial	BOD/SS	Flow* %	EDU Formula Bi-monthly	EDU Formula Monthly
1	Office Day Care Center Market w/o grinder Public Facility w/o dining Bar/Tavern w/o food Retail/Service Recreation/Amusement w/o dining	230/220	80%	0.0364 HCF	0.0729 HCF
2	Mortuary	250/350	95%	0.0526 HCF	0.1052 HCF
3	Hotel w/dining Motel w/dining Bar/Tavern w/dining Recreation/Amusement w/dining Public Facility w/dining Hospital - full service Convalescent facility	300/400	85%	0.0525 HCF	0.1050 HCF
4	Laundromat Car Wash	100/150	95%	0.0313 HCF	0.0626 HCF
5	Laundry - Com/Ind Dry Cleaner	350/500	85%	0.0607 HCF	0.1215 HCF
6	Motel w/o dining Health Spa Church/Worship	300/100	80%	0.0335 HCF	0.0670 HCF
7	Outpatient Facility Doctor Office Dental Office	225/100	90%	0.0335 HCF	0.0671 HCF
8	Restaurant - full service Restaurant - Fastfood Market w/grinder Bakery	400/300	85%	0.0521 HCF	0.1042 HCF
9	School - Public/Private K thru 12 College	230/220	5 gpd/s 10 gpd/s	0.037 x # students 0.074 x # students	0.0185 x # students 0.0370 x # students

* If account has combined domestic/landscape usage use 55% for domestic use.
(Metered consumption x 55% x EDU Formula)

MONTHLY SEWER BILLING RATE WORK SHEET FOR COMMERCIAL CATEGORIES

Category	Type of Commercial	BOD/SS	Flow %	Service Units =	Conversion to HCF Bi-monthly billing	Conversion to HCF Monthly billing	EDU Calculation Bi-monthly	EDU Calculation Monthly	EDU Formula Bi-monthly	EDU Formula Monthly
1	Office Day Care Center Market w/o grinder Public Facility w/o dining Bar/Tavern w/o food Retail/Service Recreation/Amusement w/o dining	230/220	80%	$\frac{\text{Flow}}{270}$	$\frac{\text{HCF}}{21.96}$	$\frac{\text{HCF}}{10.98}$	$\frac{.80 \text{ HCF}}{21.96}$	$\frac{.80 \text{ HCF}}{10.98}$	0.0364 HCF	0.0728 HCF
2	Mortuary	800/800	95%	$\frac{\text{Flow (2.612)}}{270}$	$\frac{\text{HCF (2.612)}}{21.96}$	$\frac{\text{HCF (2.612)}}{10.98}$	$\frac{.95 \text{ HCF (2.612)}}{21.96}$	$\frac{.95 \text{ HCF (2.612)}}{10.98}$	0.1130 HCF	0.2260 HCF
3	Hotel w/dining Motel w/dining Bar/Tavern w/dining Recreation/Amusement w/dining Public Facility w/dining Hospital - full service Convalescant facility	500/600	85%	$\frac{\text{Flow (1.917)}}{270}$	$\frac{\text{HCF (1.917)}}{21.96}$	$\frac{\text{HCF (1.917)}}{10.98}$	$\frac{.85 \text{ HCF (1.917)}}{21.96}$	$\frac{.85 \text{ HCF (1.917)}}{10.98}$	0.0742 HCF	0.1484 HCF
4	Laundromat Car Wash	100/150	95%	$\frac{\text{Flow (0.723)}}{270}$	$\frac{\text{HCF (0.723)}}{21.96}$	$\frac{\text{HCF (0.723)}}{10.98}$	$\frac{.95 \text{ HCF (0.723)}}{21.96}$	$\frac{.95 \text{ HCF (0.723)}}{10.98}$	0.0313 HCF	0.0626 HCF
5	Laundry - Com/Ind Dry Cleaner	350/500	85%	$\frac{\text{Flow (1.569)}}{270}$	$\frac{\text{HCF (1.569)}}{21.96}$	$\frac{\text{HCF (1.569)}}{10.98}$	$\frac{.85 \text{ HCF (1.569)}}{21.96}$	$\frac{.85 \text{ HCF (1.569)}}{10.98}$	0.0607 HCF	0.1214 HCF
6	Motel w/o dining Health Spa Church/Worship	300/100	80%	$\frac{\text{Flow (0.919)}}{270}$	$\frac{\text{HCF (0.919)}}{21.96}$	$\frac{\text{HCF (0.919)}}{10.98}$	$\frac{.80 \text{ HCF (0.919)}}{21.96}$	$\frac{.80 \text{ HCF (0.919)}}{10.98}$	0.0335 HCF	0.0670 HCF
7	Outpatient Facility Doctor Office Dental Office	225/100	90%	$\frac{\text{Flow (0.818)}}{270}$	$\frac{\text{HCF (0.818)}}{21.96}$	$\frac{\text{HCF (0.818)}}{10.98}$	$\frac{.90 \text{ HCF (0.818)}}{21.96}$	$\frac{.90 \text{ HCF (0.818)}}{10.98}$	0.0335 HCF	0.0670 HCF
8	Restaurant - full service Restaurant - Fastfood Market w/grinder Bakery	1000/600	85%	$\frac{\text{Flow (2.591)}}{270}$	$\frac{\text{HCF (2.591)}}{21.96}$	$\frac{\text{HCF (2.591)}}{10.98}$	$\frac{.85 \text{ HCF (2.591)}}{21.96}$	$\frac{.85 \text{ HCF (2.591)}}{10.98}$	0.1003 HCF	0.2006 HCF
9	School - Public/Private K thru 8 High/College	230/220	5 gpd/s 10 gpd/s	gpd x # of students ÷ 270	gpd/s x # of students ÷ 748 x 365 days ÷ 6 = HCF	gpd/s x # of students ÷ 748 x 365 days ÷ 12 = HCF	HCF ÷ 21.96	HCF ÷ 10.98	Flat Rate	Flat Rate

Service Unit Formula:

$$\text{SU} = \frac{\text{Flow}}{270} (0.37 + 0.31 \frac{\text{BOD}}{230} + 0.32 \frac{\text{SS}}{220})$$

Conversion to HCF (Hundreds of Cubic Feet):
 Bi-Monthly = $270 \text{ gpd} \times 365 \text{ days} \div 748 \div 6 = 21.96$
 Monthly = $270 \text{ gpd} \times 365 \text{ days} \div 748 \div 12 = 10.98$