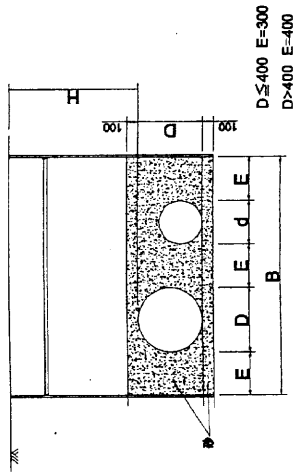
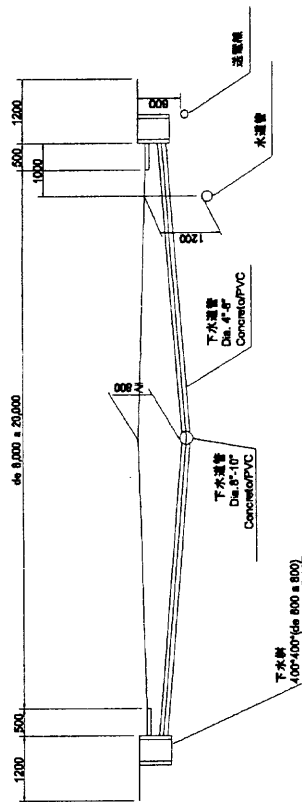
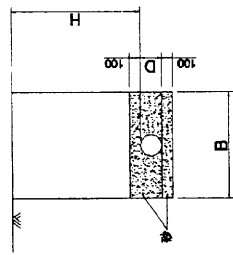


4.1 新規配水管路線図 (2008 年年度)



管埋設断面 (縮尺 1:50)

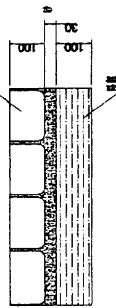


車道 (縮尺 1:100)

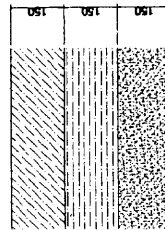
| D (mm) | H (mm) | B (mm) |
|--------|--------|--------|
| 100 | 1200 | 650 |
| 150 | 1200 | 700 |
| 200 | 1200 | 750 |
| 250 | 1200 | 800 |
| 300 | 1200 | 950 |
| 350 | 1200 | 1000 |
| 400 | 1200 | 1050 |
| 450 | 1200 | 1150 |
| 500 | 1200 | 1200 |
| 600 | 1200 | 1300 |

アスファルト舗装の道路で D ≤ 300 の場合は H = 1000mm.

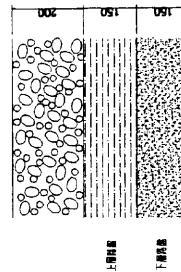
インターブロック



アスファルト



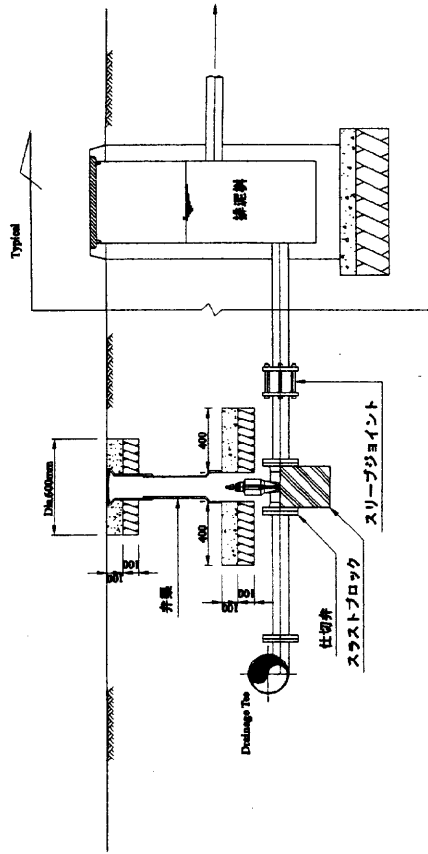
コンクリート



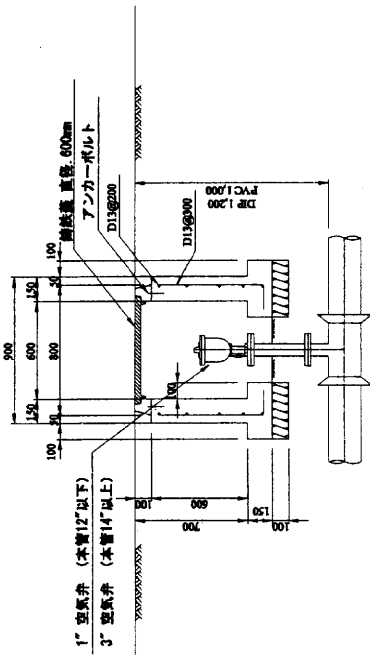
舗装断面 (縮尺 1:150)

5.1 送配水管布設断面標準図

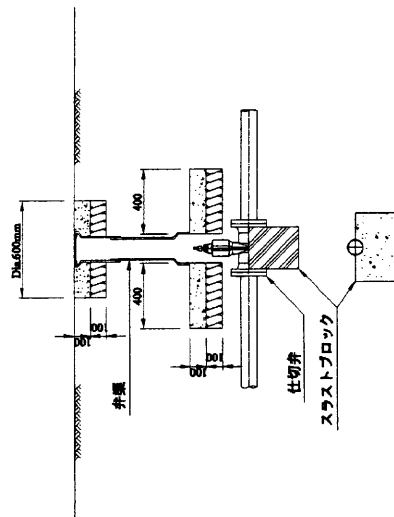
排泥弁



空気弁



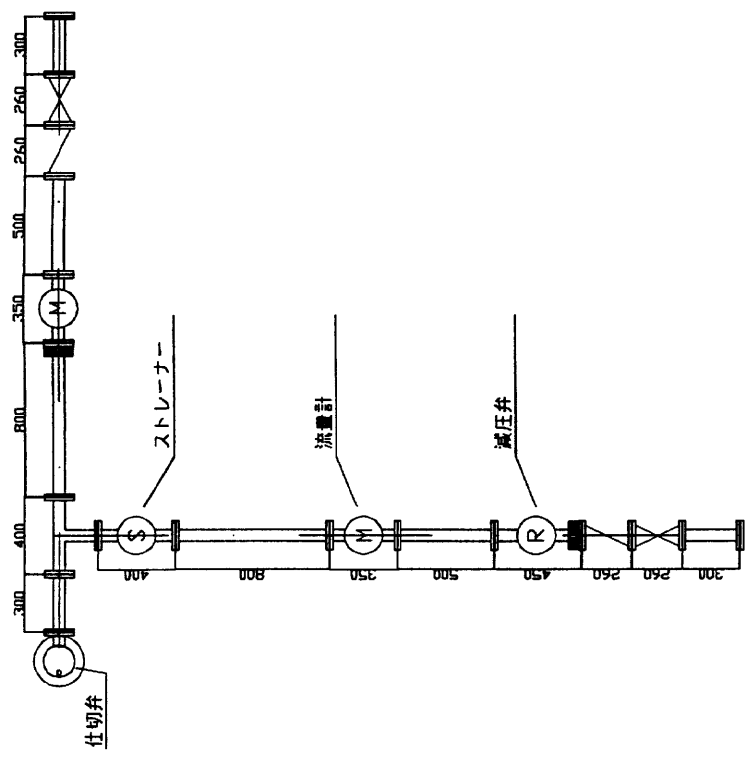
仕切弁



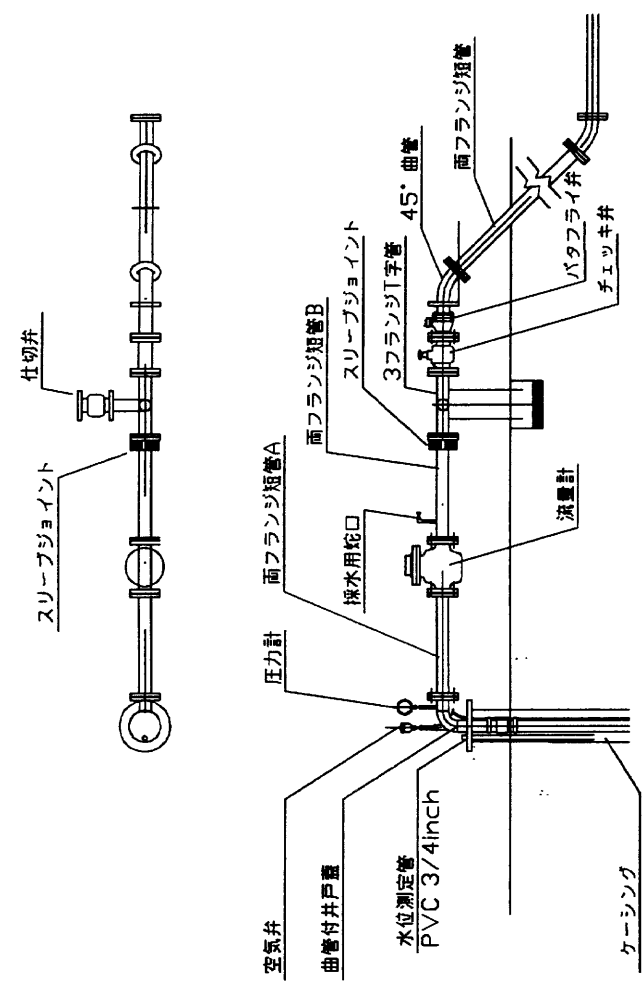
口径(インチ)

| 本管 | 泥吐管及び弁 |
|----|--------|
| 24 | 4 |
| 20 | 4 |
| 18 | 4 |
| 16 | 4 |
| 14 | 4 |
| 12 | 3 |
| 10 | 3 |
| 8 | 3 |
| 6 | 3 |
| 4 | 3 |

5.2 空気弁工、仕切弁工、排泥弁工標準図



井戸バカハ(減圧弁の設置)



井戸周り配管の管径
 4"センサーインシド、エルバライソ
 5"センサーロビコ、バカハ、ラシアエメリカス、チプレサータ

7. 基本設計概要表

| |
|---|
| 1. 案件名 |
| グアテマラ共和国ケツアルテナンゴ市給水施設改善計画 |
| 2. 要請の背景(協力の必要性・位置付け) |
| <p>グアテマラ国政府は、政策として全国民の貧富の経済格差是正、生活の最低基盤の保障を目指しており、その中で上下水道及び衛生関連施設の充実を高い優先度に位置づけている。中でも良質な飲料水を安定供給することにより、国民の健康の向上、生活環境の改善、水系伝染病の軽減等を実現することを重要課題としている。政権の開発計画である「社会政策マトリックス 2000～2004年」においても、飲料水の供給に高いプライオリティが与えられており、特に地方部や貧困層を重視する方針が打ち出されている。</p> <p>プロジェクトの対象地域であるケツアルテナンゴ市は首都圏に次ぐ第二の主要都市である。また、グアテマラ西部地域の中核都市であり、本地域の地方経済、産業とともに、当地域の先住民民族居住の中心地となっている都市である。同市の給水システムは1950年代から整備され始めたが、市の発展に伴って無計画に拡張されて来たため、現時点では配水区画とそれに対応すべき給水施設が適切なものとなっておらず、多くの問題が発生している。都市部の給水率は約95%と高い値を示すにもかかわらず、断水、給水時間の不安定、給水量、圧力の不足という問題を慢性的に抱える地区が多く、上水の安定的供給サービスが行えない状況にある。</p> <p>このような状況下、ケツアルテナンゴ市はオーストリア国の支援のもと2018年を目標とした「飲料水供給計画マスタープラン」を1999年に策定し、2000年には本件実施機関であるケツアルテナンゴ市営水道公団(EMAX)を創設し、同公団の組織強化に努めて来た。ケツアルテナンゴ市は同マスタープランに沿って水源、配水池、送配水管等の給水施設の整備を進めることとしているが、資金不足の問題からその進捗は停滞している。かかる中、2002年7月、グアテマラ国政府は日本国政府に対し、飲料水基本計画の更なる推進に資するためケツアルテナンゴ市都市部の上水道整備に係る無償資金協力の要請を行った。本計画は長期開発計画であるマスタープランの実現化の要請に沿ったものである。</p> |
| 3. プロジェクト全体計画概要 |
| <p>*下線部：本無償資金協力に直接関係する成果、活動及び投入</p> <p>(1) プロジェクト全体計画の目標(裨益対象の範囲及び規模)</p> <p>ケツアルテナンゴ市都市部の住民に飲料水が安定的に供給される。</p> <p>(裨益対象：ケツアルテナンゴ市都市部/裨益人口：約13.1万人(2008年))</p> <p>(2) プロジェクト全体計画の成果</p> <p>ア. ケツアルテナンゴ市都市部の給水施設が整備される。</p> <p>イ. プロジェクト実施機関(同市営水道公団)の運営維持管理体制が整備される。</p> <p>(3) プロジェクト全体計画の主要活動</p> <p>ア. 水源、送配水施設の整備を行なう。</p> <p>・ <u>都市部(行政区1、3、4、8、9、10のバハ配水区及びメディア配水区)の施設整備を行なう。</u></p> <p><u>裨益人口：約8.0万人</u></p> |

| |
|--|
| <ul style="list-style-type: none"> ・都市部の上記以外の地区における施設整備を行なう。 イ．漏水抑制用機材、給水メーター関連機材、管網計算プログラムソフトの調達を行なう。 ウ．漏水防止、水道経営改善につき技術指導を実施する。 エ．上水の水源、送配水施設の運営・維持管理を行なう。水道事業経営向上活動を実施する。 <p>(4) 投入(インプット)</p> <p>ア．日本側(＝本案件): 無償資金協力 17.91 億円</p> <p>イ．相手国側</p> <ul style="list-style-type: none"> ・無償資金協力に対応する負担事項履行のために必要な経費 ・無償資金協力対象外のもの他ドナーへの支援要請/自己資金による整備 ・施設の運営・維持管理に係る経費及び人員の確保 <p>(5) 実施体制</p> <p>実施機関: グアテマラ国ケツアルテナンゴ市営水道公団(EMAX)</p> |
| <p>4. 無償資金協力案件の内容</p> |
| <p>(1) サイト</p> <p>グアテマラ国ケツアルテナンゴ市都市部 (行政区 1、3、4、8、9、10 のバハ配水区及びメディア配水区)</p> <p>(2) 概要</p> <ul style="list-style-type: none"> ・水源、送配水施設の整備(配水池 2 池 6,420m³、送水管 7.8km、配水管 32.6km、井戸ポンプ更新 2ヶ所、塩素滅菌施設 1ヶ所、井戸周り配管 6ヶ所、ポンプ操作盤 7ヶ所) ・漏水抑制用機材、給水メーター関連機材、管網計算プログラムソフトの調達(一式) ・実施機関に対する漏水防止、水道経営改善に関する技術指導 <p>(3) 相手国側負担事項</p> <ul style="list-style-type: none"> ・建設用地の取得と清掃、整地、既存施設の移設 ・建設サイトまでの進入路整備 ・建設サイトまでの送電線の引込みとトランスの設置 ・建設サイトにおけるフェンス、門扉、照明等の付帯工事 ・配水区分けに伴う配水区界の配水管分離作業 <p>(4) 概算事業費</p> <p>概算事業費 18.03 億円(無償資金協力 17.91 億円、グアテマラ国側負担 0.12 億円)</p> <p>(5) 工期</p> <p>詳細設計・入札期間を含め約 31 ヶ月(予定)</p> <p>(6) 貧困、ジェンダー、環境及び社会面の配慮</p> <p>特になし。</p> |
| <p>5. 外部要因リスク</p> |
| <ul style="list-style-type: none"> ・EMAX のマスタープラン作成から携わった人員の交代があり、技術力の継続性が保たれないこと。 ・EMAX の市からの独立採算化計画達成されないこと。独立採算化までの間において市からの予算配分が保障されないこと。 |

6．過去の類似案件からの教訓の活用

施設の運転管理者教育に努め、日常の監視と運転記録を継続することにより運転実績を分析・評価し、適切な施設運転管理規則を EMAX が独自に作成することが肝要である。

7．プロジェクト全体計画の事後評価に関わる提案

(1) プロジェクト全体計画の目標達成を示す成果指標

| 指 標 | 現状値 | 計画値 |
|---------------|-----|-----|
| 24 時間通水家庭数(%) | 55 | 100 |
| 水圧問題無し世帯数(%) | 60 | 100 |

(2) その他の成果指標

水道料金収入、水道契約者数、水利用者からの利用上の意見

(3) 評価のタイミング

2008 年以降（本無償資金協力の実施完了後 1 年経過後）

8. 入手資料リスト

| 番号 | 資料名 | 形態 (図書・ビデオ・地図・写真等) | オリジナル/コピー | 入手先又は発行機関 | 発行年 |
|----|---|--------------------|-----------|---------------------------------------|----------|
| 1 | グアテマラ国 経済政策マトリックス 2000-2004 | 図書 | コピー | | 2000年5月 |
| 2 | グアテマラ国 財政政策マトリックス 2000-2004 | 図書 | コピー | | 2000年5月 |
| 3 | グアテマラ国 社会政策マトリックス 2000-2004 | 図書 | コピー | | 2000年8月 |
| 4 | グアテマラ国州/市別人口推計 2000-2005 | 図書 | オリジナル | INE(国家統計局) | 2001年1月 |
| 5 | ケツアルテナンゴン州センサス 1996 | 図書 | オリジナル | INE(国家統計局) | 1996年9月 |
| 6 | ケツアルテナンゴン市の統計情報と社会 | 図書 | オリジナル | 調査・統計・計画情報局 | 2002年12月 |
| 7 | EMAX保有機械リスト | 文書 | オリジナル | EMAX | |
| 8 | 既存井戸水質データ(2000~2003年の各月別、一般細菌・大腸菌・連鎖球菌) | 文書 | オリジナル | EMAX | |
| 9 | 既存配水池水質データ(同上) | 文書 | オリジナル | EMAX | |
| 10 | 既存井戸データ(年度、深度、口径、ポンプ電力、揚水量、柱状図) | 文書 | オリジナル | EMAX | |
| 11 | 湧水産出量データ | 文書 | オリジナル | EMAX | |
| 12 | 既存井戸及び湧水の現給水エリア面積 | 文書 | オリジナル | EMAX | |
| 13 | 各配水池容量集計表 | 文書 | オリジナル | EMAX | |
| 14 | 各井戸の測量用標高及びコメント集計表 | 文書 | オリジナル | EMAX | |
| 15 | 送・配水管の漏水箇所数の履歴 | 文書 | オリジナル | EMAX | |
| 16 | ケツアルテナンゴン航空測量写真 | 地図 | コピー | 国家地理局 | |
| 17 | ケツアルテナンゴン地形図(1:50000) | 地図 | コピー | 国家地理局 | |
| 18 | グアテマラ国地質区分図 | 地図 | コピー | INFOM(Instituto de Fomento Municipal) | |
| 19 | EMAX給水区域範囲図 | 地図 | コピー | EMAX | |
| 20 | 既存配水管網図、M/P計画配水管網図 | 地図 | コピー | EMAX | |
| 21 | グアテマラ国水道水質基準 | 文書 | コピー | EMAX | |
| 22 | ケツアルテナンゴン市水理地質調査最終報告書 | 文書 | コピー | オーストリア技術コンサルタント | 1998年12月 |

| 番号 | 資料名 | 形態 (図書・ビデオ・地図・写真等) | オリジナル/コピー | 入手先又は発行機関 | 発行年 |
|----|-------------------------------|--------------------|-----------|---|--------------|
| 23 | ケツアルテナンゴ市地方部 水資源及び給水状況統計 | 文書 | コピー | オーストリア技術コンサルタント | 1998年1月 |
| 24 | Xetuj 及び Chituxの井戸に対する提案書 | 文書 | コピー | オーストリア技術コンサルタント | 1998年9月 |
| 25 | 国家開発計画及びケツアルテナンゴ都市開発計画(短期・長期) | | | EMAX | |
| 26 | 産業・経済条件、経済成長及び国家収入 | 文書 | コピー | INE(国家統計局) | 2002年 |
| 27 | GNP及びGDP成長率 | 文書 | コピー | INE(国家統計局) | 2002年 |
| 28 | 家庭収入、家庭支出、教育システム、識字レベル | 文書 | コピー | INE(国家統計局) | 2002年 |
| 29 | インフレ率 | 文書 | コピー | http://www.ficomext.org/guatemala.a.htm | |
| 30 | 国家センサスデータ(人口、所帯、増加予想率) | 文書 | コピー | INE(国家統計局) | 2002年 |
| 31 | 水因性疾病のタイプ及び疾病数 | 文書 | コピー | 公共医療・社会福祉省 | Octubre-2003 |
| 32 | 社会基盤整備状況(電力、電話、道路、医療施設、教育) | 文書 | コピー | インフラ運営維持管理局, COVIAL | 2002年 |
| 33 | 中央銀行年度報告抜粋 | 文書 | コピー | グアテマラ銀行 | |
| 34 | 電気供給状況/廃棄物処理/下水道普及状況 | 文書 | コピー | INE(国家統計局)及びケツアルテナンゴ市電気公社 | 2002年 |
| 35 | ケツアルテナンゴ市都市域の水理地質調査報告書 | 文書 | コピー | オーストリア技術コンサルタント | 1998年1月 |
| 36 | ケツアルテナンゴ市歴史センター復興マスタープランの実施概要 | 文書 | コピー | ケツアルテナンゴ市歴史センター事務局 | |
| 37 | EMAX組織改変のためのスタディ | 文書 | コピー | オーストリア技術コンサルタント | 1999年1月 |
| 38 | EMAX運営と管理 | 文書 | コピー | オーストリア技術コンサルタント | 1999年1月 |
| 39 | 2003年ケツアルテナンゴ市資金源 | 文書 | コピー | EMAX | |
| 40 | 2000年～2002年ケツアルテナンゴ市収入 | 文書 | コピー | EMAX | |
| 41 | 2000年～2002年ケツアルテナンゴ市支出 | 文書 | コピー | EMAX | |
| 42 | EMAX総合管理システムフローチャート | 文書 | コピー | EMAX | |
| 43 | EMAX組織図 | 文書 | コピー | EMAX | |
| 44 | EMAX職掌 | 文書 | コピー | EMAX | |
| 45 | EMAXと市労組との協定書 | 文書 | コピー | EMAX | |

| 番号 | 資料名 | 形態 (図書・ビデオ・地図・写真等) | オリジナル/コピー | 入手先又は発行機関 | 発行年 |
|----|--------------------------|--------------------|-----------|-----------|-----|
| 46 | 管接続の権利及び契約書 | 電子ファイル | コピー | EMAX | |
| 47 | 井戸消費量データ | 電子ファイル | コピー | EMAX | |
| 48 | 井戸調査フォーマット | 電子ファイル | コピー | EMAX | |
| 49 | 産業リスト | 電子ファイル | コピー | EMAX | |
| 50 | 60000リットル以上の消費が想定されるユーザー | 電子ファイル | コピー | EMAX | |
| 51 | 水道消費量データ | 電子ファイル | コピー | EMAX | |
| 52 | 私有井戸リスト | 電子ファイル | コピー | EMAX | |
| 53 | 公共水栓位置及び数量 | 電子ファイル | コピー | EMAX | |
| 54 | 掘付計画に関連する基準 | 電子ファイル | コピー | EMAX | |
| 55 | EMAX水道利用者規定 | 電子ファイル | コピー | EMAX | |
| 56 | 水道形式及び料金的一般リスト | 電子ファイル | コピー | EMAX | |
| 57 | 路線リスト | 電子ファイル | コピー | EMAX | |
| 58 | 過去2年間の接続数 | 電子ファイル | コピー | EMAX | |
| 59 | 告知及びクレーム数 | 電子ファイル | コピー | EMAX | |
| 60 | 不法ユーザーのデータ | 電子ファイル | コピー | EMAX | |
| 61 | 漏水修繕情報 | 電子ファイル | コピー | EMAX | |
| 62 | EMAXの漏水調査班体制 | 電子ファイル | コピー | EMAX | |
| 63 | 機材リスト | 電子ファイル | コピー | EMAX | |
| 64 | 政策ゾーンによる接続 | 電子ファイル | コピー | EMAX | |
| 65 | 圧力ゾーンによる接続 | 電子ファイル | コピー | EMAX | |
| 66 | 管理組織図 | 電子ファイル | コピー | EMAX | |
| 67 | 一般組織図 | 電子ファイル | コピー | EMAX | |
| 68 | 運転・維持管理部組織図 | 電子ファイル | コピー | EMAX | |
| 69 | 計画部組織図 | 電子ファイル | コピー | EMAX | |

| 番号 | 資料名 | 形態 (図書・ビデオ・地図・写真等) | オリジナル/コピー | 入手先又は発行機関 | 発行年 |
|----|----------------------------|--------------------|-----------|---------------------------------------|-------|
| 70 | 公共サービス部組織図 | 電子ファイル | コピー | EMAX | |
| 71 | Formu Pres 2003 | 電子ファイル | コピー | EMAX | |
| 72 | 市役所予算資料 | 電子ファイル | コピー | EMAX | |
| 73 | 市歳出 271003(1) | 電子ファイル | コピー | EMAX | |
| 74 | 組織移転・改変資料 | 電子ファイル | コピー | EMAX | |
| 75 | 年間労働日数 | 文書 | コピー | EMAX | |
| 76 | 給水システム設計のための一般基準 | 図書 | コピー | INFOM(Instituto de Fomento Municipal) | 1979年 |
| 77 | ケツアルテナンゴ観光地図 | 図面 | オリジナル | UIEP | |
| 78 | 配水池構造図(San Isidro) | 図面 | コピー | EMAX | |
| 79 | 配水池構造図及び配管図(Rosario Bajo) | 図面 | コピー | EMAX | |
| 80 | 配水池構造図(Zona Media 4000 m³) | 図面 | コピー | EMAX | |
| 81 | 既存給水区域図 | 図面 | コピー | EMAX | |
| 82 | M/PIに基づく送水管ルート図 | 図面 | コピー | EMAX | |
| 83 | M/PIに基づく布設済み配管ルート図 | 図面 | コピー | EMAX | |
| 84 | | | | | |
| 85 | | | | | |

9. 参考資料

- 9.1 湧水産出量の測定結果
- 9.2 湧水導水管トンネル部の流量測定結果
- 9.3 既存井戸の揚水試験結果
- 9.4 水源の水質試験結果
- 9.5 漏水件数データ
- 9.6 顧客の苦情データ
- 9.7 給水需要量の推定
- 9.8 建設サイトの地質調査結果

9.1 湧水産出量の測定結果

計測器の流速算定式 $V=0.131N+0.015$

| 湧水測定ヶ所 | 水路形状 | 平均水路幅 | 水深 | 流積 | 測定時間 | ブザー音 | 回転数 | 秒当り | 流速 | 流量 | 備考 |
|------------|-----------|-------|-------|----------------|--------|------|-------|-------|------|--------|--------------------------|
| | | m | m | m ² | 秒 | 回 | | 回転数 N | V m | lit/秒 | |
| モリノビエホ | | | | | | | = 5 × | = / | = | | |
| No.10 | 台形 | 0.290 | 0.180 | 0.052 | 61.15 | 39 | 195 | 3.19 | 0.43 | 22.59 | |
| No.9 | 台形 | 0.410 | 0.108 | 0.044 | 73.80 | 39 | 195 | 2.64 | 0.36 | 15.99 | |
| No.8 | 円形 | 6" | | 0.018 | 44.83 | 30 | 150 | 3.35 | 0.45 | 8.16 | 流量積算計が設置されていないが湧流となっていない |
| No.7 | 矩形 | 0.280 | 0.205 | 0.057 | 39.76 | 40 | 200 | 5.03 | 0.67 | 38.68 | |
| No.6 | 矩形 | 0.220 | 0.120 | 0.026 | 104.75 | 30 | 150 | 1.43 | 0.20 | 5.35 | |
| No.5 | 台形 | 0.285 | 0.070 | 0.020 | 67.96 | 20 | 100 | 1.47 | 0.21 | 4.14 | |
| No.4 | 矩形 | 0.180 | 0.075 | 0.014 | 59.35 | 30 | 150 | 2.53 | 0.35 | 4.67 | |
| No.3 | 台形 | 0.120 | 0.060 | 0.007 | 53.55 | 40 | 200 | 3.73 | 0.50 | 3.63 | |
| No.2 | 台形 | 0.275 | 0.040 | 0.011 | 76.83 | 20 | 100 | 1.30 | 0.19 | 2.04 | |
| No.1 | 台形 | 0.275 | 0.115 | 0.032 | 86.37 | 20 | 100 | 1.16 | 0.17 | 5.27 | |
| 計 | | | | | | | | | | 110.53 | |
| サンタリタ | No.1-No.4 | | | | | | | | | | |
| セレン | | | | | | | | | | | |
| 計 | | | | | | | | | | 20.00 | EMAXに聞き取り |
| イシュバチコフ | | | | | | | | | | 8.00 | EMAXに聞き取り |
| シエテチヨロス | | | | | | | | | | 38.00 | EMAXに聞き取り |
| 合計 | | | | | | | | | | 176.53 | |
| 誤差10%とした場合 | | | | | | | | | | 158.88 | |

表-9.1 湧水産出量計測結果(第2次調査) 2004/1/20 10:00 ~ 12:00 計測器の流速算定式 $V=0.131N+0.015$

| 湧水測定ヶ所 | 水路形状 | 平均水路幅 m | 水深 m | 流積 m ² | 測定時間 秒 | ブザー音 回 | 回転数 | 秒当り 回転数 N | 流速 V m | 流量 lit/秒 | 備考 |
|------------|-----------|------------|---------|----------------------|-----------|-----------|-------|--------------|-----------|-------------|-----------------------------|
| モリノビエホ | | | | | | | = 5 × | = / | = | | |
| No.10 | 台形 | 0.210 | 0.180 | 0.038 | 46.16 | 30 | 150 | 3.25 | 0.44 | 16.66 | |
| No.9 | 台形 | 0.410 | 0.110 | 0.045 | 50.68 | 30 | 150 | 2.96 | 0.40 | 18.16 | |
| No.8 | 円形 | 6" | | 0.018 | 58.09 | 30 | 150 | 2.58 | 0.35 | 6.36 | 流量積算計が設置されているが 満流となっていない |
| No.7 | 矩形 | 0.275 | 0.210 | 0.058 | 54.76 | 50 | 250 | 4.57 | 0.61 | 35.40 | |
| No.6 | 矩形 | 0.260 | 0.115 | 0.030 | 55.55 | 20 | 100 | 1.80 | 0.25 | 7.50 | |
| No.5 | 台形 | 0.300 | 0.070 | 0.021 | 54.17 | 20 | 100 | 1.85 | 0.26 | 5.39 | |
| No.4 | 矩形 | 0.180 | 0.068 | 0.012 | 53.01 | 30 | 150 | 2.83 | 0.39 | 4.72 | |
| No.3 | 台形 | 0.120 | 0.060 | 0.007 | 50.73 | 40 | 200 | 3.94 | 0.53 | 3.83 | |
| No.2 | 台形 | 0.270 | 0.038 | 0.010 | 50.37 | 20 | 100 | 1.99 | 0.28 | 2.82 | |
| No.1 | 台形 | 0.275 | 0.115 | 0.032 | 65.90 | 20 | 100 | 1.52 | 0.21 | 6.76 | |
| 計 | | | | | | | | | | 107.61 | |
| サンタリタ | No.1-No.4 | | | | | | | | | | |
| セレス | | | | | | | | | | | |
| 計 | | | | | | | | | | | |
| イシュバチコフ | | | | | | | | | | 19.47 | |
| シエテチヨロス | | | | | | | | | | 7.79 | |
| 合計 | | | | | | | | | | 36.99 | |
| | | | | | | | | | | 171.86 | |
| 誤差10%とした場合 | | | | | | | | | | | 154.68 |

9.2 湧水導水管トンネル部の流量測定結果

表-9.2 湧水導水管流量測定結果 (2003年10月29日)

1. 流量測定結果

| No. | 超音波流量計 | | 備考 |
|-----|--------|-----------|--------|
| | 時刻 | 流量(L/sec) | |
| 1 | 9:40 | 159.3 | 配水バルブ開 |
| 2 | 9:45 | 160.3 | |
| 3 | 9:50 | 157.4 | |
| 4 | 9:55 | 157.4 | |
| 5 | 10:00 | 154.1 | |

<湧水導水管>

・ACP呼び径 450mm

外径: 500mm

内径: 450mm

肉厚: 25mm

2. 導水管の通水能力検討

使用公式: マニング公式 (CyberNet v3.1) 及びヘーゼン・ウィリアム公式
条件:

- 始点標高: 2406.143m (合流枡流出管頂)
- 終点標高: 2396.658m (San Isidro配水池HWL)
- 管路: ACP450mm, L=3810m (満管、マニング: n=0.011、ヘーゼン: C=140) } 標高差: 9.485m

下流部(トンネル出口)計測点

| No. | 超音波流量計 | | パーシャル・フロウム | | 備考 |
|-----|--------|-----------|------------|----|--------|
| | 時刻 | 流量(L/sec) | 水位(FT) | 流量 | |
| 1 | 11:42 | 157.2 | | | 配水バルブ開 |
| 2 | 11:47 | 156.7 | | | |
| 3 | 11:52 | 156.9 | | | |
| 4 | 11:57 | 156.0 | | | |
| 5 | 12:02 | 155.6 | 0.30 | | 配水バルブ閉 |
| 6 | 12:15 | 154.3 | 0.31 | | |
| 7 | 12:20 | 155.1 | 0.30 | | |
| 8 | 12:25 | 155.5 | 0.31 | | |

| 流量 | | マニング公式 | | ヘーゼン公式 | |
|-----|--------|----------|-------------|----------|-------------|
| | | 損失水頭 (m) | 導水勾配 (m/km) | 損失水頭 (m) | 導水勾配 (m/km) |
| L/s | M3/min | 10.22 | 2.68 | 8.45 | 2.22 |
| 175 | 10.50 | 9.64 | 2.53 | 8.01 | 2.10 |
| 170 | 10.20 | 9.08 | 2.38 | 7.58 | 1.99 |
| 165 | 9.90 | 8.54 | 2.24 | 7.16 | 1.88 |
| 160 | 9.60 | 8.02 | 2.10 | 6.75 | 1.77 |
| 155 | 9.30 | | | | |

3. 結果

上流点及び下流点での流量測定結果に差がほとんどないため、トンネル部での漏水はないと判断される。トンネル部導水管の通水能力は、上記水理計算より160 ~ 165^{トリス}/秒と考えられる。

9.3 既存井戸の揚水試験結果

ソーロヒコ、パカハ、ソナ 8、チョキアルト、チリエス 4 の 5 本の既存井戸の揚水試験を現地再委託にて実施した結果は下記の通りである。

(1) 井戸 ソーロヒコ

予備揚水試験

36 ㍓/秒で開始。静水位である - 56.10m から試験を開始して 1 分目から計測, 1 分目までの降下量は 0m。その後 5 分間連続同水位。5 分目に 38 ㍓/秒として - 56.42m に降下。

段階揚水試験

揚水量を 20、25、30、35、38 ㍓/秒で 5 段階変化させた。各揚水量間の水位降下量は 0.03、0.29、0.29、0.03、0.28m と僅か。2 時間間隔の一定揚水量の間は水位降下は認められない。全水位降下量は 0.92m と僅か。両対数グラフにプロットした揚水量 Q と水位降下量 s からは一定の傾向はなく、変曲点が明確に判断できない。限界揚水量は優に本最大試験流量以上あるものと思われる。

連続揚水試験、水位回復試験

連続試験は試験最大揚水量の 95% の 36 ㍓/秒で連続 24 時間試験。初期水位 - 56.10m から 1 分後に - 57.02m となりその後水位降下は認められず安定していた。全水位降下量は 0.92m。ポンプ停止後 1 分で - 56.11m まで水位は回復、その後 - 56.10m で継続して一定。

結論

段階試験は試験の最大揚水量 38 ㍓/秒に至るまで、各水量変化後わずか 1 分で安定水位となる。また試験結果の揚水量 - 水位曲線からは変曲点が明確に判断できない。連続試験水位回復試験で流量変化後、即水位が安定、かつ水位降下量は 0.92m、回復量 0.92m と僅か。従って、適正揚水量を 36 ㍓/秒として問題はないと考えられる。

(2) 井戸 パカハ

予備揚水試験

36 ㍓/秒で実施。静水位である - 50.94m から試験を開始して 1 分目から計測。1 分目までの降下量は、0.62m。その後 60 分間連続 36 ㍓/秒、水位降下量は 25 分目まで 0.62m。降下量は若干増え 30 分目で、- 0.90m になった。

段階揚水試験

揚水量を 20、25、30、35、39 ㍓/秒で 5 段階変化させた、各揚水量間の水位降下量は 0.31、0.28、0.02、0.01、0.28m。2 時間づつの一定揚水量の間は水位降下は認められない。全水位降下量は 0.89m。両対数グラフにプロットした揚水量 Q と水位降下量 s からは一定の傾向はなく、変曲点が明確に判断できない。限界揚水量は優に本最大試験流量以上あるものと思われる。

連続揚水試験、水位回復試験

35 ㍓/秒で連続 24 時間試験。初期水位 - 50.94m から 1 分後に - 51.48m となりその後水位降

下はきわめて少なく安定していた。1440 分経過後 - 51.83m で安定。全水位降下量は 0.90m。ポンプ停止後 1 分で - 50.95m まで水位は回復、その後 90 分間 - 50.94m で一定。

結論

段階試験は試験の最大揚水量 39 L/s に至るまで、各水量変化後わずか 1 分で安定水位となる。また試験結果の揚水量 - 水位曲線からは変曲点が明確に判断できない。連続試験は試験最大揚水量の 90% の 35 L/s で実施。連続試験水位回復試験で流量変化後、即水位が安定、かつ水位降下量は 0.89m、回復量 0.89m とわずか。従って、適正揚水量を 35 L/s とする。

(3) 井戸 ソナ 8

予備揚水試験

26、37、42、46 L/s で実施。静水位である - 95.13m から試験を開始して 1 分目から計測。1 分目までの降下量は、3.35m。その後流量を増量の度に水位は 2.73m、1.24m 降下。

段階揚水試験

揚水量を 20、25、30、35、40、44 L/s で 6 段階変化させた。全揚水量間の水位降下量は 10.36m。両対数グラフにプロットした揚水量 Q と水位降下量 s からは明瞭な変曲点は判断できない。試験の最大揚水量 44 L/s を限界揚水量と判断する。

連続揚水試験、水位回復試験

44 L/s の約 80% の 38.5 L/s で連続 24 時間試験。初期水位 - 95.13m から 1 分後に - 98.33m となりその後水位降下は少なく 120 分後に安定水位 - 103.36m となった。1440 分経過後の - 103.38m まで安定。全水位降下量は 8.25m。

結論

試験結果の揚水量 - 水位曲線からは変曲点が明瞭に判断できない。試験最大水量 44 L/s の約 80% の 38.5 L/s にて連続揚水試験を始めてから短時間で水位は安定、回復も早い。従って、適正揚水量を 38.5 L/s とする。

(4) 井戸 チョキアルト

予備揚水試験

44 L/s で実施。静水位である - 56.74m から試験を開始して 105 分後に - 64.64m で安定水位。全体の降下量は 7.9m。

段階揚水試験

揚水量を 20、25、30、35、40、44 L/s の 6 段階変化で実施。試験時における全水位降下量は - 56.74m から - 64.65m の 7.91m。両対数グラフにプロットした揚水量 Q と水位降下量 s からは明瞭な変曲点は判別できない。各揚水量変化点においては、35 L/s までは変化後即安定しているが 40 L/s 以上は 2 時間では完全に安定水位となっていない。

連続揚水試験、水位回復試験

最大揚水試験量の 44 L/s の約 80% の 36 L/s で連続 24 時間試験。初期水位 - 57.01m から 1 分後に - 61.61m と降下するが、その後水位降下は少なく 120 分後に安定水位 - 62.81m とな

る。1440 分経過後の - 62.84m に至るまで一様に安定。全水位降下量は 5.83m。

結論

段階試験は揚水量 35 ㍈/秒に至るまで、各水量変化後わずか 1 分で安定水位となる。また 40 ㍈/秒、44 ㍈/秒の場合も揚水時間が 2 時間と限られているが安定に近い状態になっている。試験結果の揚水量 - 水位曲線からは変曲点が明確に判断できない。連続試験は段階試験で安定が確認された 36 ㍈/秒で実施、水位はポンプの起動、停止に即反応し水位は安定する。従って、適正揚水量を 36 ㍈/秒とする。

(5) 井戸 チリエス 4

予備揚水試験

20 ㍈/秒で実施。静水位である - 4.59m から試験を開始して 120 分継続。揚水開始から 1 分で - 11.30m まで降下、2 分後に安定水位 - 10.98m に落ち着いている。全体の降下量は、6.39m。予備揚水試験の結果からは、20 ㍈/秒以上の限界揚水量が予想される。

段階揚水試験

揚水量を 8、11、15、18、20 ㍈/秒の 5 段階変化で実施。試験時における全水位降下量は - 4.59m から - 10.99m までの 6.4m。両対数グラフにプロットした揚水量 Q と水位降下量 s からは 20 ㍈/秒以上の場合の試験結果がないため明らかではないが、既知のデータからは直線の変曲点は明瞭に判断できない。15 ㍈/秒から 18 ㍈/秒の揚水量変化時点で 2.12m の水位降下があるが、その後の 18 ㍈/秒から 20 ㍈/秒の揚水量変化時の降下量は 0.93m と減少している。

連続揚水試験、水位回復試験

20 ㍈/秒で連続 24 時間試験。初期水位 - 4.59m から 1 分後に - 10.69m となりその後水位降下変化は少なく 18 分後に安定水位 - 10.98m となり 1440 分経過後まで一様に安定。全水位降下量は 6.39m。回復試験では、ポンプ停止後 1 分で、初期水位 - 4.59m に回復。

結論

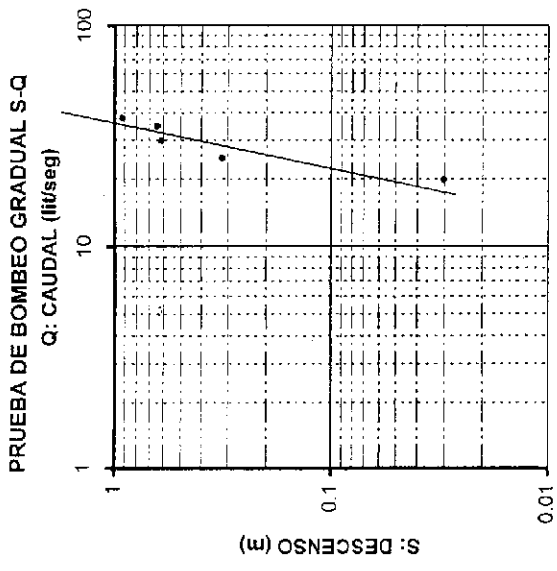
試験結果の揚水量 - 水位曲線からは明確な変曲点が判断できない。20 ㍈/秒での連続試験は短時間に安定水位に達し、初期水位への回復も 1 分以内である。20 ㍈/秒で連続揚水試験をしているが、適正揚水量は優に 20 ㍈/秒以上あるものと想定される。

Pozo Zoologico

| | | | |
|----------------------|--|------------------|--------|
| ORIFICIO: MEDIDOR | PRUEBA DE BOMBEO GRADUAL | LINEA DE AL | PIES |
| NIVEL DE BOMBEO: | Empresa Municipal De Agua Quetzaltenango | BOMBA INS | METROS |
| NIVEL ESTATICO: 56.1 | Propietario | PRODUCCION | G.P.M. |
| EQUIPO: L-9 | Pozo Zoologico Zona 3 Quetzaltenango | BOMBA US/ETAPAS: | 60 HP. |
| | Dirección | OPERADOR: | |
| | | VICENTE AGUIRRE | |

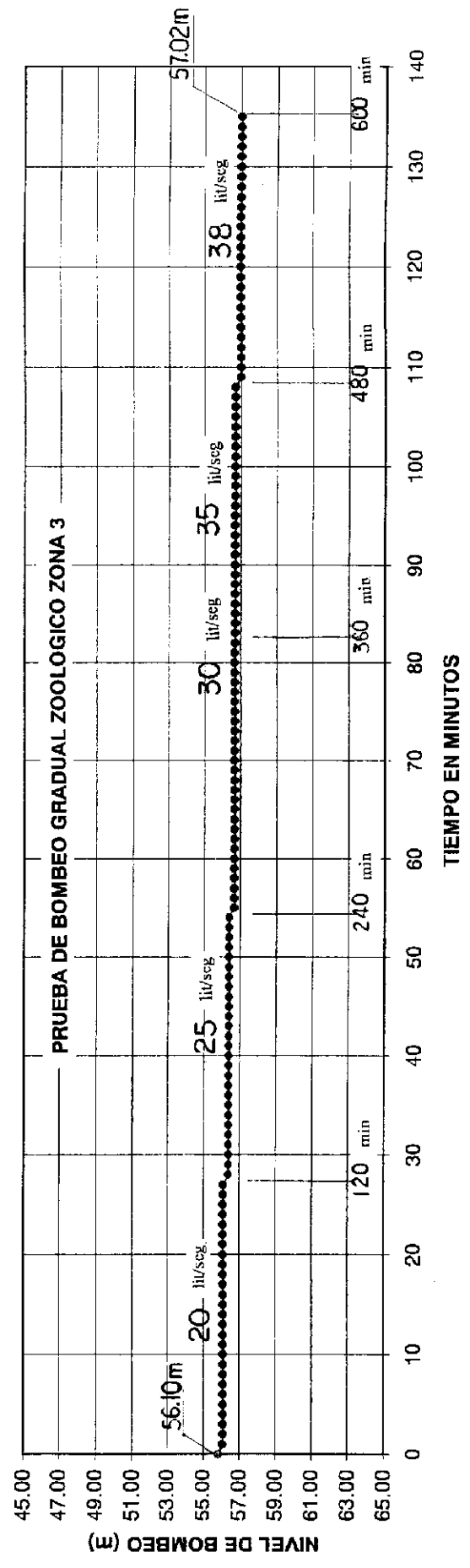
| FECHA: | TIEMPO | | NIVEL EN | NIVEL EN | NIVELES | | Abatimiento | PRODUCCION | OBSERVACIONES |
|----------|--------|---------|----------|----------|----------|----------|-------------|--------------------|-----------------|
| | Hora | Minutos | Pies | Metros | Dinámico | Estático | | Litros Por segundo | |
| 2004/2/9 | 8:35 | 0 | 184.01 | 56.10 | 0.00 | 56.1 | -56.10 | 20 | PRIMER ESCALON |
| | | 2 | 184.11 | 56.13 | 56.13 | | 0.03 | 20 | CON 20 LPS. |
| | | 3 | 184.11 | 56.13 | 56.13 | | 0.03 | 20 | |
| | | 4 | 184.11 | 56.13 | 56.13 | | 0.03 | 20 | |
| | | 5 | 184.11 | 56.13 | 56.13 | | 0.03 | 20 | |
| | | 6 | 184.11 | 56.13 | 56.13 | | 0.03 | 20 | |
| | | 7 | 184.11 | 56.13 | 56.13 | | 0.03 | 20 | |
| | | 8 | 184.11 | 56.13 | 56.13 | | 0.03 | 20 | |
| | | 9 | 184.11 | 56.13 | 56.13 | | 0.03 | 20 | |
| | | 10 | 184.11 | 56.13 | 56.13 | | 0.03 | 20 | |
| | | 12 | 184.11 | 56.13 | 56.13 | | 0.03 | 20 | |
| | | 14 | 184.11 | 56.13 | 56.13 | | 0.03 | 20 | |
| | | 16 | 184.11 | 56.13 | 56.13 | | 0.03 | 20 | |
| | | 18 | 184.11 | 56.13 | 56.13 | | 0.03 | 20 | |
| | | 20 | 184.11 | 56.13 | 56.13 | | 0.03 | 20 | |
| | | 25 | 184.11 | 56.13 | 56.13 | | 0.03 | 20 | |
| | | 30 | 184.11 | 56.13 | 56.13 | | 0.03 | 20 | |
| | | 35 | 184.11 | 56.13 | 56.13 | | 0.03 | 20 | |
| | | 40 | 184.11 | 56.13 | 56.13 | | 0.03 | 20 | |
| | | 45 | 184.11 | 56.13 | 56.13 | | 0.03 | 20 | |
| | | 50 | 184.11 | 56.13 | 56.13 | | 0.03 | 20 | |
| | | 55 | 184.11 | 56.13 | 56.13 | | 0.03 | 20 | |
| | | 60 | 184.11 | 56.13 | 56.13 | | 0.03 | 20 | |
| | | 75 | 184.11 | 56.13 | 56.13 | | 0.03 | 20 | |
| | | 90 | 184.11 | 56.13 | 56.13 | | 0.03 | 20 | |
| | | 105 | 184.11 | 56.13 | 56.13 | | 0.03 | 20 | |
| | | 120 | 184.11 | 56.13 | 56.13 | | 0.03 | 20 | |
| | | 1 | 185.07 | 56.42 | 56.42 | | 0.32 | 25 | SEGUNDO ESCALON |
| | | 2 | 185.07 | 56.42 | 56.42 | | 0.32 | 25 | CON 25 LPS. |
| | | 3 | 185.07 | 56.42 | 56.42 | | 0.32 | 25 | |
| | | 4 | 185.07 | 56.42 | 56.42 | | 0.32 | 25 | |
| | | 5 | 185.07 | 56.42 | 56.42 | | 0.32 | 25 | |
| | | 6 | 185.07 | 56.42 | 56.42 | | 0.32 | 25 | |
| | | 7 | 185.07 | 56.42 | 56.42 | | 0.32 | 25 | |
| | | 8 | 185.07 | 56.42 | 56.42 | | 0.32 | 25 | |
| | | 9 | 185.07 | 56.42 | 56.42 | | 0.32 | 25 | |
| | | 10 | 185.07 | 56.42 | 56.42 | | 0.32 | 25 | |
| | | 12 | 185.07 | 56.42 | 56.42 | | 0.32 | 25 | |
| | | 14 | 185.07 | 56.42 | 56.42 | | 0.32 | 25 | |
| | | 16 | 185.07 | 56.42 | 56.42 | | 0.32 | 25 | |
| | | 18 | 185.07 | 56.42 | 56.42 | | 0.32 | 25 | |
| | | 20 | 185.07 | 56.42 | 56.42 | | 0.32 | 25 | |
| | | 25 | 185.07 | 56.42 | 56.42 | | 0.32 | 25 | |
| | | 30 | 185.07 | 56.42 | 56.42 | | 0.32 | 25 | |
| | | 35 | 185.07 | 56.42 | 56.42 | | 0.32 | 25 | |
| | | 40 | 185.07 | 56.42 | 56.42 | | 0.32 | 25 | |
| | | 45 | 185.07 | 56.42 | 56.42 | | 0.32 | 25 | |
| | | 50 | 185.07 | 56.42 | 56.42 | | 0.32 | 25 | |
| | | 55 | 185.07 | 56.42 | 56.42 | | 0.32 | 25 | |
| | | 60 | 185.07 | 56.42 | 56.42 | | 0.32 | 25 | |
| | | 75 | 185.07 | 56.42 | 56.42 | | 0.32 | 25 | |
| | | 90 | 185.07 | 56.42 | 56.42 | | 0.32 | 25 | |
| | | 105 | 185.07 | 56.42 | 56.42 | | 0.32 | 25 | |
| | | 120 | 185.07 | 56.42 | 56.42 | | 0.32 | 25 | |
| 2004/2/9 | | 1 | 186.02 | 56.71 | 56.71 | | 0.61 | 30 | TERCER ESCALON |
| | | 2 | 186.02 | 56.71 | 56.71 | | 0.61 | 30 | CON 30 LPS. |
| | | 3 | 186.02 | 56.71 | 56.71 | | 0.61 | 30 | |
| | | 4 | 186.02 | 56.71 | 56.71 | | 0.61 | 30 | |
| | | 5 | 186.02 | 56.71 | 56.71 | | 0.61 | 30 | |
| | | 6 | 186.02 | 56.71 | 56.71 | | 0.61 | 30 | |
| | | 7 | 186.02 | 56.71 | 56.71 | | 0.61 | 30 | |
| | | 8 | 186.02 | 56.71 | 56.71 | | 0.61 | 30 | |
| | | 9 | 186.02 | 56.71 | 56.71 | | 0.61 | 30 | |
| | | 10 | 186.02 | 56.71 | 56.71 | | 0.61 | 30 | |
| | | 12 | 186.02 | 56.71 | 56.71 | | 0.61 | 30 | |
| | | 14 | 186.02 | 56.71 | 56.71 | | 0.61 | 30 | |
| | | 16 | 186.02 | 56.71 | 56.71 | | 0.61 | 30 | |
| | | 18 | 186.02 | 56.71 | 56.71 | | 0.61 | 30 | |
| | | 20 | 186.02 | 56.71 | 56.71 | | 0.61 | 30 | |
| | | 25 | 186.02 | 56.71 | 56.71 | | 0.61 | 30 | |
| | | 30 | 186.02 | 56.71 | 56.71 | | 0.61 | 30 | |

| | | | | | | | | | |
|----------|--|-----|--------|-------|-------|--|------|----|----------------|
| | | 35 | 186.02 | 56.71 | 56.71 | | 0.61 | 30 | |
| | | 40 | 186.02 | 56.71 | 56.71 | | 0.61 | 30 | |
| | | 45 | 186.02 | 56.71 | 56.71 | | 0.61 | 30 | |
| | | 50 | 186.02 | 56.71 | 56.71 | | 0.61 | 30 | |
| | | 55 | 186.02 | 56.71 | 56.71 | | 0.61 | 30 | |
| | | 60 | 186.02 | 56.71 | 56.71 | | 0.61 | 30 | |
| | | 75 | 186.02 | 56.71 | 56.71 | | 0.61 | 30 | |
| | | 90 | 186.02 | 56.71 | 56.71 | | 0.61 | 30 | |
| | | 105 | 186.02 | 56.71 | 56.71 | | 0.61 | 30 | |
| | | 120 | 186.02 | 56.71 | 56.71 | | 0.61 | 30 | |
| 2004/2/9 | | 1 | 186.11 | 56.74 | 56.74 | | 0.64 | 35 | CUARTO ESCALON |
| | | 2 | 186.11 | 56.74 | 56.74 | | 0.64 | 35 | 35 LPS. |
| | | 3 | 186.11 | 56.74 | 56.74 | | 0.64 | 35 | |
| | | 4 | 186.11 | 56.74 | 56.74 | | 0.64 | 35 | |
| | | 5 | 186.11 | 56.74 | 56.74 | | 0.64 | 35 | |
| | | 6 | 186.11 | 56.74 | 56.74 | | 0.64 | 35 | |
| | | 7 | 186.11 | 56.74 | 56.74 | | 0.64 | 35 | |
| | | 8 | 186.11 | 56.74 | 56.74 | | 0.64 | 35 | |
| | | 9 | 186.11 | 56.74 | 56.74 | | 0.64 | 35 | |
| | | 10 | 186.11 | 56.74 | 56.74 | | 0.64 | 35 | |
| | | 12 | 186.11 | 56.74 | 56.74 | | 0.64 | 35 | |
| | | 14 | 186.11 | 56.74 | 56.74 | | 0.64 | 35 | |
| | | 16 | 186.11 | 56.74 | 56.74 | | 0.64 | 35 | |
| | | 18 | 186.11 | 56.74 | 56.74 | | 0.64 | 35 | |
| | | 20 | 186.11 | 56.74 | 56.74 | | 0.64 | 35 | |
| | | 25 | 186.11 | 56.74 | 56.74 | | 0.64 | 35 | |
| | | 30 | 186.11 | 56.74 | 56.74 | | 0.64 | 35 | |
| | | 35 | 186.11 | 56.74 | 56.74 | | 0.64 | 35 | |
| | | 40 | 186.11 | 56.74 | 56.74 | | 0.64 | 35 | |
| | | 45 | 186.11 | 56.74 | 56.74 | | 0.64 | 35 | |
| | | 50 | 186.11 | 56.74 | 56.74 | | 0.64 | 35 | |
| | | 55 | 186.11 | 56.74 | 56.74 | | 0.64 | 35 | |
| | | 60 | 186.11 | 56.74 | 56.74 | | 0.64 | 35 | |
| | | 75 | 186.11 | 56.74 | 56.74 | | 0.64 | 35 | |
| | | 90 | 186.11 | 56.74 | 56.74 | | 0.64 | 35 | |
| | | 105 | 186.11 | 56.74 | 56.74 | | 0.64 | 35 | |
| | | 120 | 186.11 | 56.74 | 56.74 | | 0.64 | 35 | |
| 2004/2/9 | | 1 | 187.04 | 57.02 | 57.02 | | 0.92 | 38 | QUINTO ESCALON |
| | | 2 | 187.04 | 57.02 | 57.02 | | 0.92 | 38 | |
| | | 3 | 187.04 | 57.02 | 57.02 | | 0.92 | 38 | |
| | | 4 | 187.04 | 57.02 | 57.02 | | 0.92 | 38 | |
| | | 5 | 187.04 | 57.02 | 57.02 | | 0.92 | 38 | |
| | | 6 | 187.04 | 57.02 | 57.02 | | 0.92 | 38 | |
| | | 7 | 187.04 | 57.02 | 57.02 | | 0.92 | 38 | |
| | | 8 | 187.04 | 57.02 | 57.02 | | 0.92 | 38 | |
| | | 9 | 187.04 | 57.02 | 57.02 | | 0.92 | 38 | |
| | | 10 | 187.04 | 57.02 | 57.02 | | 0.92 | 38 | |
| | | 12 | 187.04 | 57.02 | 57.02 | | 0.92 | 38 | |
| | | 14 | 187.04 | 57.02 | 57.02 | | 0.92 | 38 | |
| | | 16 | 187.04 | 57.02 | 57.02 | | 0.92 | 38 | |
| | | 18 | 187.04 | 57.02 | 57.02 | | 0.92 | 38 | |
| | | 20 | 187.04 | 57.02 | 57.02 | | 0.92 | 38 | |
| | | 25 | 187.04 | 57.02 | 57.02 | | 0.92 | 38 | |
| | | 30 | 187.04 | 57.02 | 57.02 | | 0.92 | 38 | |
| | | 35 | 187.04 | 57.02 | 57.02 | | 0.92 | 38 | |
| | | 40 | 187.04 | 57.02 | 57.02 | | 0.92 | 38 | |
| | | 45 | 187.04 | 57.02 | 57.02 | | 0.92 | 38 | |
| | | 50 | 187.04 | 57.02 | 57.02 | | 0.92 | 38 | |
| | | 55 | 187.04 | 57.02 | 57.02 | | 0.92 | 38 | |
| | | 60 | 187.04 | 57.02 | 57.02 | | 0.92 | 38 | |
| | | 75 | 187.04 | 57.02 | 57.02 | | 0.92 | 38 | |
| | | 90 | 187.04 | 57.02 | 57.02 | | 0.92 | 38 | |
| | | 105 | 187.04 | 57.02 | 57.02 | | 0.92 | 38 | |
| | | 120 | 187.04 | 57.02 | 57.02 | | 0.92 | 38 | |
| | | 1 | 184.02 | 56.10 | 56.10 | | 0.00 | | RECUPERACION |
| | | 2 | 184.02 | 56.10 | 56.10 | | 0.00 | | |



| Escalón | Caudal Q (lit/seg) | Desenso s (m) |
|---------|--------------------|---------------|
| 1 | 20 | 0.03 |
| 2 | 25 | 0.32 |
| 3 | 30 | 0.61 |
| 4 | 35 | 0.64 |
| 5 | 38 | 0.92 |

CAUDAL ESTIMADO PARA LA PRUEBA DE BOMBEO CONTINUA DE 36 LITROS POR SEGUNDO.

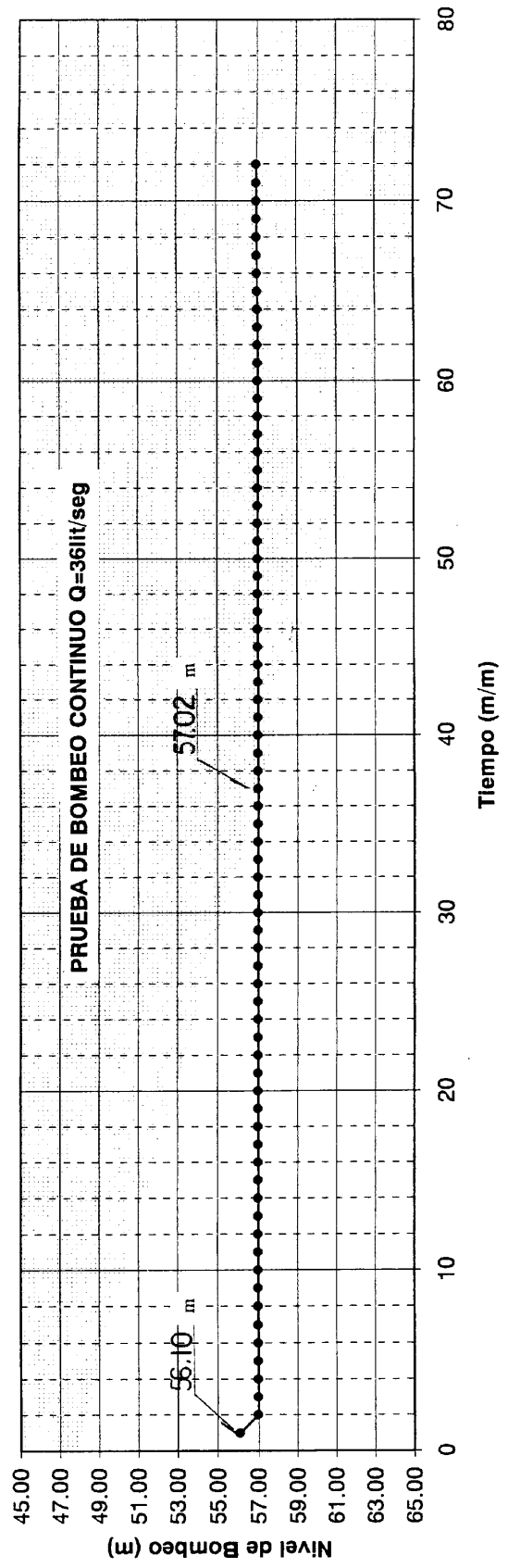
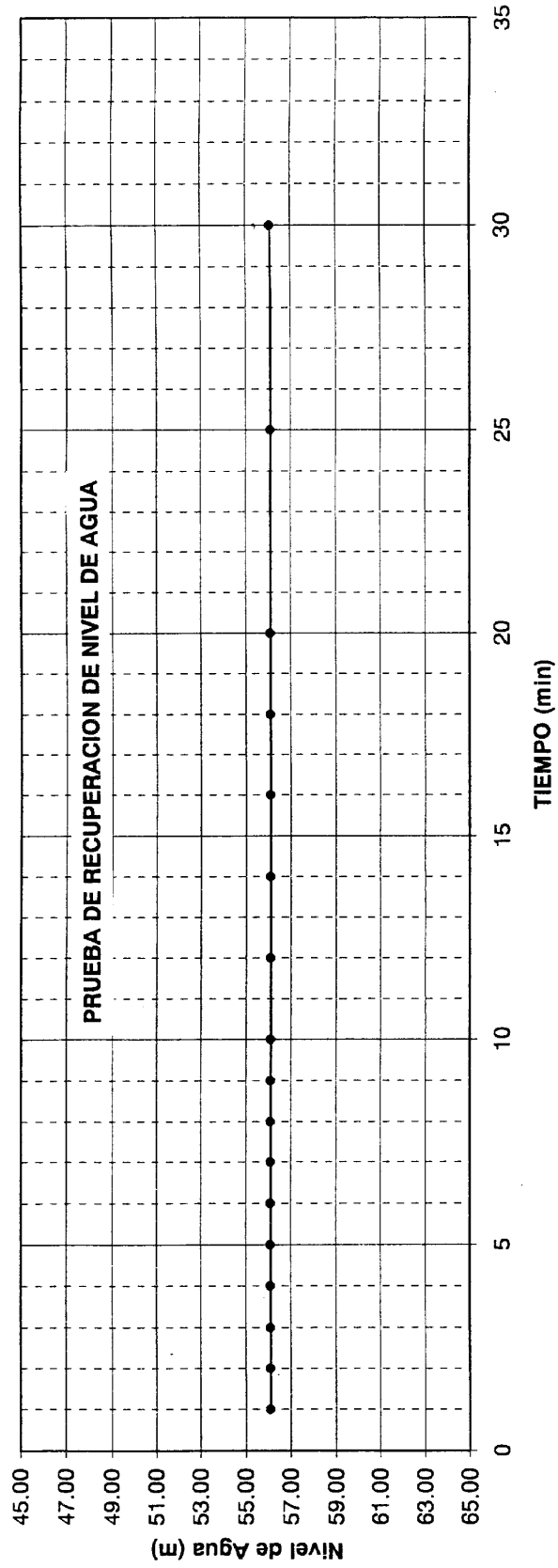


| | | | | |
|------------------|--|---------------------|-----------------------|--------|
| ORIFICIO: | PRUEBA DE BOMBEO CONTINUA | LINEA DE AIRE A : | Sonda Electrica | PIES |
| NIVEL DE BOMBEO: | 57.01 Empresa Municipal De Agua Quetzaltenango | BOMBA INSTALADA A : | 118 | PIES |
| NIVEL ESTATICO: | 56.10 Propietario | PRODUCCION: | 36 | L.P.M. |
| EQUIPO: | L-9 Pozo Zoologico Z. 3 Quetzaltenango | BOMBA USADA DE: 8 | ETAPAS: | 60 HP. |
| | Dirección | OPERADOR: | MANUEL AGUIRRE | |

| FECHA: | TIEMPO | | NIVEL EN | | NIVELES | | Abatimiento | PRODUCCION | OBSERVACIONES |
|-----------|--------|---------|----------|--------|----------|----------|-------------|--------------------|-----------------|
| | Hora | Minutos | Pies | Metros | Dinámico | Estático | | Litros Por segundo | |
| 2004/2/10 | 6:35 | 0 | 184.01 | 56.10 | 0.00 | 56.10 | 0 | | |
| | | 1 | 187.01 | 57.02 | 57.02 | | 0.92 | 36 | |
| | | 2 | 187.01 | 57.02 | 57.02 | | 0.92 | 36 | |
| | | 3 | 187.01 | 57.02 | 57.02 | | 0.92 | 36 | |
| | | 4 | 187.01 | 57.02 | 57.02 | | 0.92 | 36 | |
| | | 5 | 187.01 | 57.02 | 57.02 | | 0.92 | 36 | PRUEBA DE LARGA |
| | | 6 | 187.01 | 57.02 | 57.02 | | 0.92 | 36 | DURACION |
| | | 7 | 187.01 | 57.02 | 57.02 | | 0.92 | 36 | CONTINUA |
| | | 8 | 187.01 | 57.02 | 57.02 | | 0.92 | 36 | |
| | | 9 | 187.01 | 57.02 | 57.02 | | 0.92 | 36 | |
| | | 10 | 187.01 | 57.02 | 57.02 | | 0.92 | 36 | |
| | | 12 | 187.01 | 57.02 | 57.02 | | 0.92 | 36 | |
| | | 14 | 187.01 | 57.02 | 57.02 | | 0.92 | 36 | |
| | | 16 | 187.01 | 57.02 | 57.02 | | 0.92 | 36 | |
| | | 18 | 187.01 | 57.02 | 57.02 | | 0.92 | 36 | |
| | | 20 | 187.01 | 57.02 | 57.02 | | 0.92 | 36 | |
| | | 25 | 187.01 | 57.02 | 57.02 | | 0.92 | 36 | |
| | | 30 | 187.01 | 57.02 | 57.02 | | 0.92 | 36 | |
| | | 35 | 187.01 | 57.02 | 57.02 | | 0.92 | 36 | |
| | | 40 | 187.01 | 57.02 | 57.02 | | 0.92 | 36 | |
| | | 45 | 187.01 | 57.02 | 57.02 | | 0.92 | 36 | |
| | | 50 | 187.01 | 57.02 | 57.02 | | 0.92 | 36 | |
| | | 55 | 187.01 | 57.02 | 57.02 | | 0.92 | 36 | |
| | | 60 | 187.01 | 57.02 | 57.02 | | 0.92 | 36 | |
| | | 75 | 187.01 | 57.02 | 57.02 | | 0.92 | 36 | |
| | | 90 | 187.01 | 57.02 | 57.02 | | 0.92 | 36 | |
| | | 105 | 187.01 | 57.02 | 57.02 | | 0.92 | 36 | |
| | | 120 | 187.01 | 57.02 | 57.02 | | 0.92 | 36 | |
| | | 150 | 187.01 | 57.02 | 57.02 | | 0.92 | 36 | |
| | | 180 | 187.01 | 57.02 | 57.02 | | 0.92 | 36 | |
| | | 210 | 187.02 | 57.02 | 57.02 | | 0.92 | 36 | |
| | | 240 | 187.02 | 57.02 | 57.02 | | 0.92 | 36 | |
| | | 270 | 187.02 | 57.02 | 57.02 | | 0.92 | 36 | |
| | | 300 | 187.02 | 57.02 | 57.02 | | 0.92 | 36 | |
| | | 330 | 187.02 | 57.02 | 57.02 | | 0.92 | 36 | |
| | | 360 | 187.02 | 57.02 | 57.02 | | 0.92 | 36 | |
| | | 390 | 187.02 | 57.02 | 57.02 | | 0.92 | 36 | |
| | | 420 | 187.02 | 57.02 | 57.02 | | 0.92 | 36 | |
| | | 450 | 187.02 | 57.02 | 57.02 | | 0.92 | 36 | |
| | | 480 | 187.02 | 57.02 | 57.02 | | 0.92 | 36 | |
| | | 510 | 187.02 | 57.02 | 57.02 | | 0.92 | 36 | |
| | | 540 | 187.02 | 57.02 | 57.02 | | 0.92 | 36 | |
| | | 570 | 187.02 | 57.02 | 57.02 | | 0.92 | 36 | |
| | | 600 | 187.02 | 57.02 | 57.02 | | 0.92 | 36 | |
| | | 630 | 187.02 | 57.02 | 57.02 | | 0.92 | 36 | |
| | | 660 | 187.02 | 57.02 | 57.02 | | 0.92 | 36 | |
| | | 690 | 187.02 | 57.02 | 57.02 | | 0.92 | 36 | |
| | | 720 | 187.02 | 57.02 | 57.02 | | 0.92 | 36 | |
| | | 750 | 187.02 | 57.02 | 57.02 | | 0.92 | 36 | |
| | | 780 | 187.02 | 57.02 | 57.02 | | 0.92 | 36 | |
| | | 810 | 187.02 | 57.02 | 57.02 | | 0.92 | 36 | |
| | | 840 | 187.02 | 57.02 | 57.02 | | 0.92 | 36 | |
| | | 870 | 187.02 | 57.02 | 57.02 | | 0.92 | 36 | |
| | | 900 | 187.02 | 57.02 | 57.02 | | 0.92 | 36 | |
| | | 930 | 187.02 | 57.02 | 57.02 | | 0.92 | 36 | |
| | | 960 | 187.02 | 57.02 | 57.02 | | 0.92 | 36 | |
| | | 990 | 187.02 | 57.02 | 57.02 | | 0.92 | 36 | |
| | | 1020 | 187.02 | 57.02 | 57.02 | | 0.92 | 36 | |
| | | 1050 | 187.02 | 57.02 | 57.02 | | 0.92 | 36 | |
| | | 1080 | 187.02 | 57.02 | 57.02 | | 0.92 | 36 | |
| | | 1110 | 187.02 | 57.02 | 57.02 | | 0.92 | 36 | |
| | | 1140 | 187.02 | 57.02 | 57.02 | | 0.92 | 36 | |
| | | 1170 | 187.02 | 57.02 | 57.02 | | 0.92 | 36 | |
| | | 1200 | 187.02 | 57.02 | 57.02 | | 0.92 | 36 | |
| | | 1230 | 187.02 | 57.02 | 57.02 | | 0.92 | 36 | |
| | | 1260 | 187.02 | 57.02 | 57.02 | | 0.92 | 36 | |
| | | 1290 | 187.02 | 57.02 | 57.02 | | 0.92 | 36 | |
| | | 1320 | 187.02 | 57.02 | 57.02 | | 0.92 | 36 | |
| | | 1350 | 187.02 | 57.02 | 57.02 | | 0.92 | 36 | |
| 2004/2/11 | | 1380 | 187.02 | 57.02 | 57.02 | | 0.92 | 36 | |
| | | 1410 | 187.02 | 57.02 | 57.02 | | 0.92 | 36 | |
| | | 1440 | 187.02 | 57.02 | 57.02 | | 0.92 | 36 | |

| | | | |
|------------------|--|--|------------------------------|
| ORIFICIO: | PRUEBA DE RECUPERACION DE NIVEL DE AGUA | LINEA DE AIRE A : | Sonda Electric: PIES |
| NIVEL DE BOMBEO: | <u>57.01</u> | Empresa Municipal De Agua Quetzaltenango | BOMBA INSTALADA 119 PIES |
| NIVEL ESTATICO: | <u>56.1</u> | Propietario | PRODUCCION: 36 L.P.M. |
| EQUIPO: | <u>L-9</u> | Pozo Zoologico Z. 3 Quetzaltenango | BOMBA USADA DE: ETAP, 60 HP. |
| | | Dirección | OPERADOR: <u>MANUEL AGU</u> |

| FECHA: | TIEMPO | | NIVEL EN | NIVELES | | Abatimiento | PRODUCCION | OBSERVACIONES |
|-----------|--------|---------|----------|---------|----------|-------------|------------|---------------|
| | Hora | Minutos | Pies | Metros | Dinámico | | Estático | |
| 2004/2/11 | | 1 | 184.04 | 56.11 | 56.11 | | | OPERACION |
| | | 2 | 184.03 | 56.11 | 56.11 | | | |
| | | 3 | 184.02 | 56.10 | 56.10 | | | |
| | | 4 | 184.02 | 56.10 | 56.10 | | | |
| | | 5 | 184.02 | 56.10 | 56.10 | | | |
| | | 6 | 184.02 | 56.10 | 56.10 | | | |
| | | 7 | 184.02 | 56.10 | 56.10 | | | |
| | | 8 | 184.02 | 56.10 | 56.10 | | | |
| | | 9 | 184.02 | 56.10 | 56.10 | | | |
| | | 10 | 184.02 | 56.10 | 56.10 | | | |
| | | 12 | 184.02 | 56.10 | 56.10 | | | |
| | | 14 | 184.02 | 56.10 | 56.10 | | | |
| | | 16 | 184.02 | 56.10 | 56.10 | | | |
| | | 18 | 184.02 | 56.10 | 56.10 | | | |
| | | 20 | 184.02 | 56.10 | 56.10 | | | |
| | | 25 | 184.02 | 56.10 | 56.10 | | | |
| | | 30 | 184.02 | 56.10 | 56.10 | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |



Pozo Pacaja

| | | | | |
|------------------------|--|---------------------|-----------------------|--------|
| ORIFICIO: MEDIDOR | PRUEBA DE BOMBEO GRADUAL | LINEA DE AIRE A : | 118.9 | PIES |
| NIVEL DE BOMBEO: 51.24 | Empresa Municipal De Agua Quetzaltenango | BOMBA INSTALADA A : | 96.64 | PIES |
| NIVEL ESTATICO: 50.93 | Propietario | PRODUCCION: | 20 LTS. | G.P.M. |
| EQUIPO: L-9 | Pozo Pacaja La Reina 2.10 Quetzaltenango | BOMBA USADA DE: 8 | ETAPAS: | 60 HP. |
| | Dirección | OPERADOR: | <u>MANUEL AGUIRRE</u> | |

| FECHA: | TIEMPO | | PIES | NIVEL EN | | NIVELES | Abatimiento | PRODUCCION | OBSERVACIONES |
|----------|--------|---------|--------|--------------------|--------|---------|-------------|------------|-----------------|
| | Hora | Minutos | | Litros Por segundo | | | | | |
| 2004/2/4 | 8:06 | 0 | 167.08 | 50.939 | 0.00 | 50.939 | 20 | | |
| | | 1 | 168.08 | 51.244 | 51.244 | | 0.30 | 20 | PRIMER ESCALON |
| | | 2 | 168.08 | 51.244 | 51.244 | | 0.30 | 20 | 20 LPS. |
| | | 3 | 168.08 | 51.244 | 51.244 | | 0.30 | 20 | |
| | | 4 | 168.08 | 51.244 | 51.244 | | 0.30 | 20 | |
| | | 5 | 168.08 | 51.244 | 51.244 | | 0.30 | 20 | |
| | | 6 | 168.08 | 51.244 | 51.244 | | 0.30 | 20 | |
| | | 7 | 168.08 | 51.244 | 51.244 | | 0.30 | 20 | |
| | | 8 | 168.08 | 51.244 | 51.244 | | 0.30 | 20 | |
| | | 9 | 168.08 | 51.244 | 51.244 | | 0.30 | 20 | |
| | | 10 | 168.08 | 51.244 | 51.244 | | 0.30 | 20 | |
| | | 12 | 168.08 | 51.244 | 51.244 | | 0.30 | 20 | |
| | | 14 | 168.08 | 51.244 | 51.244 | | 0.30 | 20 | |
| | | 16 | 168.08 | 51.244 | 51.244 | | 0.30 | 20 | |
| | | 18 | 168.08 | 51.244 | 51.244 | | 0.30 | 20 | |
| | | 20 | 168.08 | 51.244 | 51.244 | | 0.30 | 20 | |
| | | 25 | 168.08 | 51.244 | 51.244 | | 0.30 | 20 | |
| | | 30 | 168.08 | 51.244 | 51.244 | | 0.30 | 20 | |
| | | 35 | 168.08 | 51.244 | 51.244 | | 0.30 | 20 | |
| | | 40 | 168.08 | 51.244 | 51.244 | | 0.30 | 20 | |
| | | 45 | 168.08 | 51.244 | 51.244 | | 0.30 | 20 | |
| | | 50 | 168.08 | 51.244 | 51.244 | | 0.30 | 20 | |
| | | 55 | 168.08 | 51.244 | 51.244 | | 0.30 | 20 | |
| | 9:06 | 60 | 168.08 | 51.244 | 51.244 | | 0.30 | 20 | |
| | | 75 | 168.08 | 51.244 | 51.244 | | 0.30 | 20 | |
| | | 90 | 168.08 | 51.244 | 51.244 | | 0.30 | 20 | |
| | | 105 | 168.08 | 51.244 | 51.244 | | 0.30 | 20 | |
| | 10:06 | 120 | 168.08 | 51.244 | 51.244 | | 0.30 | 20 | |
| 2004/2/4 | 10:07 | 1 | 169.00 | 51.524 | 51.524 | | 0.59 | 25 | SEGUNDO ESCALON |
| | | 2 | 169.00 | 51.524 | 51.524 | | 0.59 | 25 | CON 25 LPS. |
| | | 3 | 169.00 | 51.524 | 51.524 | | 0.59 | 25 | |
| | | 4 | 169.00 | 51.524 | 51.524 | | 0.59 | 25 | |
| | | 5 | 169.00 | 51.524 | 51.524 | | 0.59 | 25 | |
| | | 6 | 169.00 | 51.524 | 51.524 | | 0.59 | 25 | |
| | | 7 | 169.00 | 51.524 | 51.524 | | 0.59 | 25 | |
| | | 8 | 169.00 | 51.524 | 51.524 | | 0.59 | 25 | |
| | | 9 | 169.00 | 51.524 | 51.524 | | 0.59 | 25 | |
| | | 10 | 169.00 | 51.524 | 51.524 | | 0.59 | 25 | |
| | | 12 | 169.00 | 51.524 | 51.524 | | 0.59 | 25 | |
| | | 14 | 169.00 | 51.524 | 51.524 | | 0.59 | 25 | |
| | | 16 | 169.00 | 51.524 | 51.524 | | 0.59 | 25 | |
| | | 18 | 169.00 | 51.524 | 51.524 | | 0.59 | 25 | |
| | | 20 | 169.00 | 51.524 | 51.524 | | 0.59 | 25 | |
| | | 25 | 169.00 | 51.524 | 51.524 | | 0.59 | 25 | |
| | | 30 | 169.00 | 51.524 | 51.524 | | 0.59 | 25 | |
| | | 35 | 169.00 | 51.524 | 51.524 | | 0.59 | 25 | |
| | | 40 | 169.00 | 51.524 | 51.524 | | 0.59 | 25 | |
| | | 45 | 169.00 | 51.524 | 51.524 | | 0.59 | 25 | |
| | | 50 | 169.00 | 51.524 | 51.524 | | 0.59 | 25 | |
| | | 55 | 169.00 | 51.524 | 51.524 | | 0.59 | 25 | |
| | 11:07 | 60 | 169.00 | 51.524 | 51.524 | | 0.59 | 25 | |
| | | 75 | 169.00 | 51.524 | 51.524 | | 0.59 | 25 | |
| | | 90 | 169.00 | 51.524 | 51.524 | | 0.59 | 25 | |
| | | 105 | 169.00 | 51.524 | 51.524 | | 0.59 | 25 | |
| | 12:06 | 120 | 169.00 | 51.524 | 51.524 | | 0.59 | 25 | |
| 2004/2/4 | 12:07 | 1 | 169.04 | 51.537 | 51.537 | | 0.60 | 30 | TERCER ESCALON |
| | | 2 | 169.04 | 51.537 | 51.537 | | 0.60 | 30 | CON 30 LPS. |
| | | 3 | 169.04 | 51.537 | 51.537 | | 0.60 | 30 | |
| | | 4 | 169.04 | 51.537 | 51.537 | | 0.60 | 30 | |
| | | 5 | 169.04 | 51.537 | 51.537 | | 0.60 | 30 | |
| | | 6 | 169.04 | 51.537 | 51.537 | | 0.60 | 30 | |
| | | 7 | 169.04 | 51.537 | 51.537 | | 0.60 | 30 | |
| | | 8 | 169.04 | 51.537 | 51.537 | | 0.60 | 30 | |
| | | 9 | 169.04 | 51.537 | 51.537 | | 0.60 | 30 | |
| | | 10 | 169.04 | 51.537 | 51.537 | | 0.60 | 30 | |
| | | 12 | 169.04 | 51.537 | 51.537 | | 0.60 | 30 | |
| | | 14 | 169.04 | 51.537 | 51.537 | | 0.60 | 30 | |
| | | 16 | 169.04 | 51.537 | 51.537 | | 0.60 | 30 | |
| | | 18 | 169.04 | 51.537 | 51.537 | | 0.60 | 30 | |
| | | 20 | 169.04 | 51.537 | 51.537 | | 0.60 | 30 | |

| | | | | | | | | | |
|----------|-------|-----|--------|--------|--------|--|------|----|----------------|
| | | 25 | 169.04 | 51.537 | 51.537 | | 0.60 | 30 | |
| | | 30 | 169.04 | 51.537 | 51.537 | | 0.60 | 30 | |
| | | 35 | 169.04 | 51.537 | 51.537 | | 0.60 | 30 | |
| | | 40 | 169.04 | 51.537 | 51.537 | | 0.60 | 30 | |
| | | 45 | 169.04 | 51.537 | 51.537 | | 0.60 | 30 | |
| | | 50 | 169.04 | 51.537 | 51.537 | | 0.60 | 30 | |
| | | 55 | 169.04 | 51.537 | 51.537 | | 0.60 | 30 | |
| | 13:07 | 60 | 169.04 | 51.537 | 51.537 | | 0.60 | 30 | |
| | | 75 | 169.04 | 51.537 | 51.537 | | 0.60 | 30 | |
| | | 90 | 169.04 | 51.537 | 51.537 | | 0.60 | 30 | |
| | | 105 | 169.04 | 51.537 | 51.537 | | 0.60 | 30 | |
| | 14:06 | 120 | 169.04 | 51.537 | 51.537 | | 0.60 | 30 | |
| 2004/2/4 | 14:07 | 1 | 169.10 | 51.555 | 51.555 | | 0.62 | 35 | CUARTO ESCALON |
| | | 2 | 169.10 | 51.555 | 51.555 | | 0.62 | 35 | CON 35 LPS. |
| | | 3 | 169.10 | 51.555 | 51.555 | | 0.62 | 35 | |
| | | 4 | 169.10 | 51.555 | 51.555 | | 0.62 | 35 | |
| | | 5 | 169.10 | 51.555 | 51.555 | | 0.62 | 35 | |
| | | 6 | 169.10 | 51.555 | 51.555 | | 0.62 | 35 | |
| | | 7 | 169.10 | 51.555 | 51.555 | | 0.62 | 35 | |
| | | 8 | 169.10 | 51.555 | 51.555 | | 0.62 | 35 | |
| | | 9 | 169.10 | 51.555 | 51.555 | | 0.62 | 35 | |
| | | 10 | 169.10 | 51.555 | 51.555 | | 0.62 | 35 | |
| | | 12 | 169.10 | 51.555 | 51.555 | | 0.62 | 35 | |
| | | 14 | 169.10 | 51.555 | 51.555 | | 0.62 | 35 | |
| | | 16 | 169.10 | 51.555 | 51.555 | | 0.62 | 35 | |
| | | 18 | 169.10 | 51.555 | 51.555 | | 0.62 | 35 | |
| | | 20 | 169.10 | 51.555 | 51.555 | | 0.62 | 35 | |
| | | 25 | 169.10 | 51.555 | 51.555 | | 0.62 | 35 | |
| | | 30 | 169.10 | 51.555 | 51.555 | | 0.62 | 35 | |
| | | 35 | 169.10 | 51.555 | 51.555 | | 0.62 | 35 | |
| | | 40 | 169.10 | 51.555 | 51.555 | | 0.62 | 35 | |
| | | 45 | 169.10 | 51.555 | 51.555 | | 0.62 | 35 | |
| | | 50 | 169.10 | 51.555 | 51.555 | | 0.62 | 35 | |
| | | 55 | 169.10 | 51.555 | 51.555 | | 0.62 | 35 | |
| | 15:07 | 60 | 169.10 | 51.555 | 51.555 | | 0.62 | 35 | |
| | | 75 | 169.10 | 51.555 | 51.555 | | 0.62 | 35 | |
| | | 90 | 169.10 | 51.555 | 51.555 | | 0.62 | 35 | |
| | | 105 | 169.10 | 51.555 | 51.555 | | 0.62 | 35 | |
| | 16:06 | 120 | 169.10 | 51.555 | 51.555 | | 0.62 | 35 | |
| 2004/2/4 | 16:07 | 1 | 170.03 | 51.838 | 51.838 | | 0.90 | 39 | QUINTO ESCALON |
| | | 2 | 170.03 | 51.838 | 51.838 | | 0.90 | 39 | 39 LPS. |
| | | 3 | 170.03 | 51.838 | 51.838 | | 0.90 | 39 | |
| | | 4 | 170.03 | 51.838 | 51.838 | | 0.90 | 39 | |
| | | 5 | 170.03 | 51.838 | 51.838 | | 0.90 | 39 | |
| | | 6 | 170.03 | 51.838 | 51.838 | | 0.90 | 39 | |
| | | 7 | 170.03 | 51.838 | 51.838 | | 0.90 | 39 | |
| | | 8 | 170.03 | 51.838 | 51.838 | | 0.90 | 39 | |
| | | 9 | 170.03 | 51.838 | 51.838 | | 0.90 | 39 | |
| | | 10 | 170.03 | 51.838 | 51.838 | | 0.90 | 39 | |
| | | 12 | 170.03 | 51.838 | 51.838 | | 0.90 | 39 | |
| | | 14 | 170.03 | 51.838 | 51.838 | | 0.90 | 39 | |
| | | 16 | 170.03 | 51.838 | 51.838 | | 0.90 | 39 | |
| | | 18 | 170.03 | 51.838 | 51.838 | | 0.90 | 39 | |
| | | 20 | 170.03 | 51.838 | 51.838 | | 0.90 | 39 | |
| | | 25 | 170.03 | 51.838 | 51.838 | | 0.90 | 39 | |
| | | 30 | 170.03 | 51.838 | 51.838 | | 0.90 | 39 | |
| | | 35 | 170.03 | 51.838 | 51.838 | | 0.90 | 39 | |
| | | 40 | 170.03 | 51.838 | 51.838 | | 0.90 | 39 | |
| | | 45 | 170.03 | 51.838 | 51.838 | | 0.90 | 39 | |
| | | 50 | 170.03 | 51.838 | 51.838 | | 0.90 | 39 | |
| | | 55 | 170.03 | 51.838 | 51.838 | | 0.90 | 39 | |
| | 16:07 | 60 | 170.03 | 51.838 | 51.838 | | 0.90 | 39 | |
| | | 75 | 170.03 | 51.838 | 51.838 | | 0.90 | 39 | |
| | | 90 | 170.03 | 51.838 | 51.838 | | 0.90 | 39 | |
| | | 105 | 170.03 | 51.838 | 51.838 | | 0.90 | 39 | |
| | 18:07 | 120 | 170.03 | 51.838 | 51.838 | | 0.90 | 39 | |

ORIFICIO: MEDIDOR **RECUPERACION DE PRUEBA DE BOMBEO GRADUAL**
 NIVEL DE BOMBEO: 50.93 Empresa Municipal De Agua Quetzaltenango
 NIVEL ESTATICO: 50.93 Propietario
 EQUIPO: L-9 Pozo Pacaja La Reina 2.10 Quetzaltenango
 Dirección

LINEA DE AIRE A : 118.9 PIES
 BOMBA INSTALADA 96.64 PIES
 PRODUCCION: 20 LTS. G.P.M.
 BOMBA USADA DE: ETAPAS: 60 HP.
 OPERADOR: MANUEL AGUIRRE

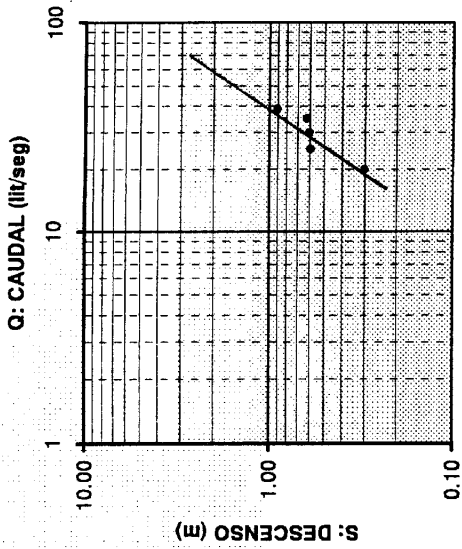
| FECHA: | TIEMPO | | Pies | NIVEL EN Metros | NIVELES | | Abatimiento | PRODUCCION Litros Por segundo | OBSERVACIONES |
|----------|--------|---------|--------|--------------------|----------|----------|-------------|----------------------------------|---------------|
| | Hora | Minutos | | | Dinámico | Estático | | | |
| 2004/2/4 | 18:08 | 1 | 167.11 | 50.948 | 50.948 | | 0.01 | | RECUPERACION |
| | | 2 | 167.09 | 50.942 | 50.942 | | 0.00 | | |
| | | 3 | 167.09 | 50.942 | 50.942 | | 0.00 | | |
| | | 4 | 167.09 | 50.942 | 50.942 | | 0.00 | | |
| | | 5 | 167.09 | 50.942 | 50.942 | | 0.00 | | |
| | | 6 | 167.09 | 50.942 | 50.942 | | 0.00 | | |
| | | 7 | 167.09 | 50.942 | 50.942 | | 0.00 | | |
| | | 8 | 167.09 | 50.942 | 50.942 | | 0.00 | | |
| | | 9 | 167.09 | 50.942 | 50.942 | | 0.00 | | |
| | | 10 | 167.09 | 50.942 | 50.942 | | 0.00 | | |
| | | 12 | 167.09 | 50.942 | 50.942 | | 0.00 | | |
| | | 14 | 167.09 | 50.942 | 50.942 | | 0.00 | | |
| | | 16 | 167.09 | 50.942 | 50.942 | | 0.00 | | |
| | | 18 | 167.09 | 50.942 | 50.942 | | 0.00 | | |
| | | 20 | 167.09 | 50.942 | 50.942 | | 0.00 | | |
| | | 25 | 167.09 | 50.942 | 50.942 | | 0.00 | | |
| | | 30 | 167.09 | 50.942 | 50.942 | | 0.00 | | |
| | | 35 | 167.09 | 50.942 | 50.942 | | 0.00 | | |
| | | 40 | 167.09 | 50.942 | 50.942 | | 0.00 | | |
| | | 45 | 167.09 | 50.942 | 50.942 | | 0.00 | | |
| | | 50 | 167.09 | 50.942 | 50.942 | | 0.00 | | |
| | | 55 | 167.09 | 50.942 | 50.942 | | 0.00 | | |
| | | 60 | 167.09 | 50.942 | 50.942 | | 0.00 | | |

ORIFICIO: MEDIDOR **PRUEBA DE BOMBEO PRELIMINAR**
 NIVEL DE BOMBEO: 51.84 Empresa Municipal De Agua Quetzaltenango
 NIVEL ESTATICO: 50.93 Propietario
 EQUIPO: L-9 Pozo Pacaja La Reina Z.10 Quetzaltenango
 Dirección

LINEA DE AIRE A : SONDA ELECTRICA PIES
 BOMBA INSTALADA A : 118.9 MTS.
 PRODUCCION: 39 LTS.
 BOMBA USADA DE: 8 ETAPAS: 60 HP.
 OPERADOR: MANUEL AGUIRRE

| FECHA: | TIEMPO | | Pies | NIVEL EN Metros | NIVELES | | Abatimiento | PRODUCCION Litros Por segundo | OBSERVACIONES |
|----------|--------|---------|--------|--------------------|----------|----------|-------------|----------------------------------|---------------|
| | Hora | Minutos | | | Dinámico | Estático | | | |
| 2004/2/4 | 6:20 | 0 | 167.08 | 50.939 | 50.939 | | 0.00 | 36 | |
| | | 1 | 169.11 | 51.558 | 51.558 | | 0.62 | 36 | |
| | | 2 | 169.11 | 51.558 | 51.558 | | 0.62 | 36 | |
| | | 3 | 169.11 | 51.558 | 51.558 | | 0.62 | 36 | |
| | | 4 | 169.11 | 51.558 | 51.558 | | 0.62 | 36 | |
| | | 5 | 169.11 | 51.558 | 51.558 | | 0.62 | 36 | |
| | | 6 | 169.11 | 51.558 | 51.558 | | 0.62 | 36 | |
| | | 7 | 169.11 | 51.558 | 51.558 | | 0.62 | 36 | |
| | | 8 | 169.11 | 51.558 | 51.558 | | 0.62 | 36 | |
| | | 9 | 169.11 | 51.558 | 51.558 | | 0.62 | 36 | |
| | | 10 | 169.11 | 51.558 | 51.558 | | 0.62 | 36 | |
| | | 12 | 169.11 | 51.558 | 51.558 | | 0.62 | 36 | |
| | | 14 | 169.11 | 51.558 | 51.558 | | 0.62 | 36 | |
| | | 16 | 169.11 | 51.558 | 51.558 | | 0.62 | 36 | |
| | | 18 | 169.11 | 51.558 | 51.558 | | 0.62 | 36 | |
| | | 20 | 169.11 | 51.558 | 51.558 | | 0.62 | 36 | |
| | | 25 | 169.11 | 51.558 | 51.558 | | 0.62 | 36 | |
| | | 30 | 170.04 | 51.841 | 51.841 | | 0.90 | 36 | |
| | | 35 | 170.04 | 51.841 | 51.841 | | 0.90 | 36 | |
| | | 40 | 170.04 | 51.841 | 51.841 | | 0.90 | 36 | |
| | | 45 | 170.04 | 51.841 | 51.841 | | 0.90 | 36 | |
| | | 50 | 170.04 | 51.841 | 51.841 | | 0.90 | 36 | |
| | | 55 | 170.04 | 51.841 | 51.841 | | 0.90 | 36 | |
| | | 7:20 | 60 | 170.04 | 51.841 | 51.841 | 0.90 | 36 | |

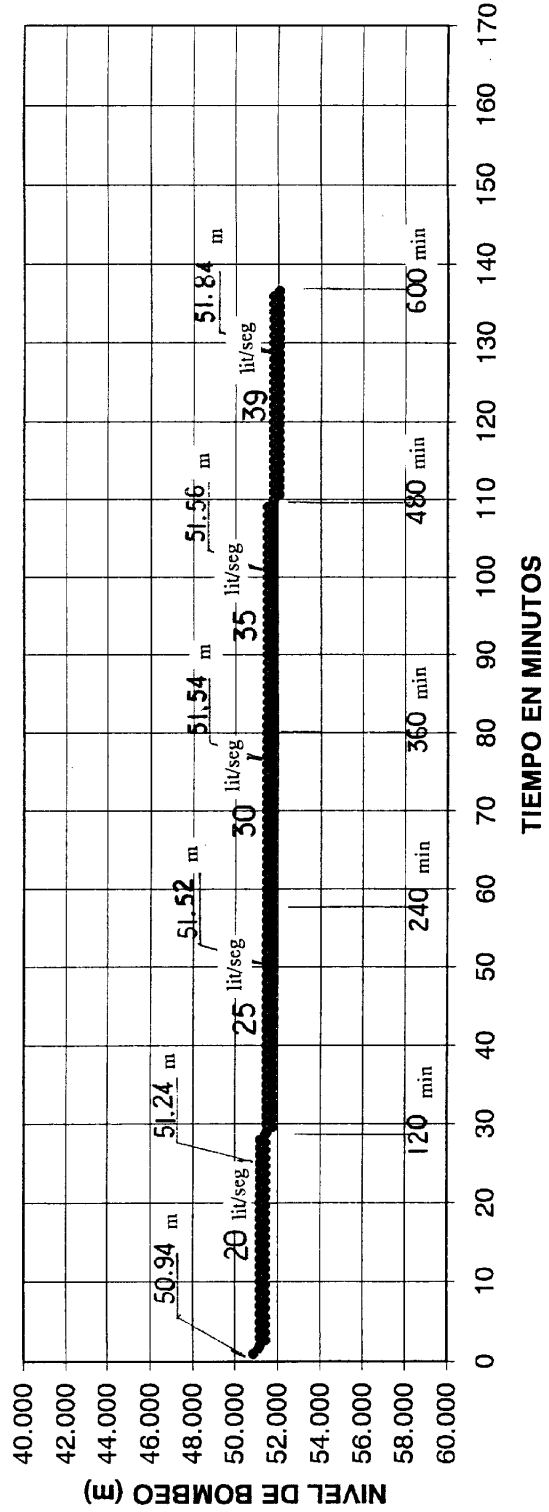
PRUEBA DE BOMBEO GRADUAL S-Q



| Escalón | Caudal Q (lit/seg) | Desenso s (m) |
|---------|--------------------|---------------|
| 1 | 20 | 0.30 |
| 2 | 25 | 0.59 |
| 3 | 30 | 0.60 |
| 4 | 35 | 0.62 |
| 5 | 39 | 0.90 |

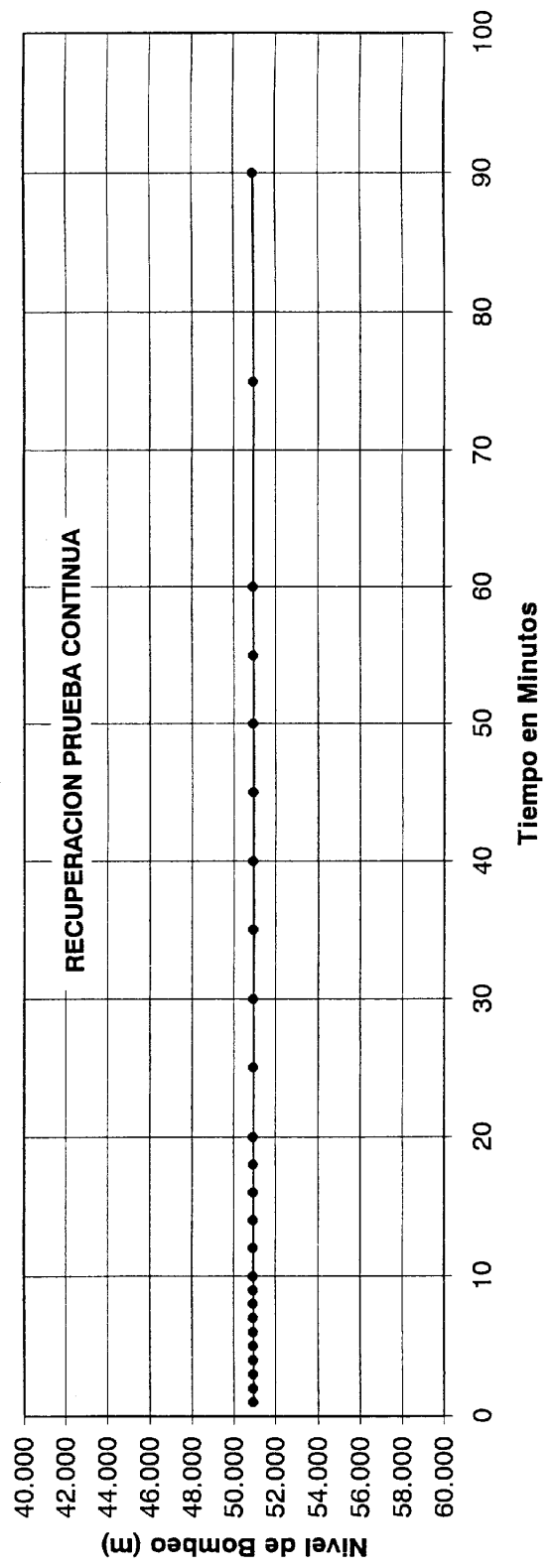
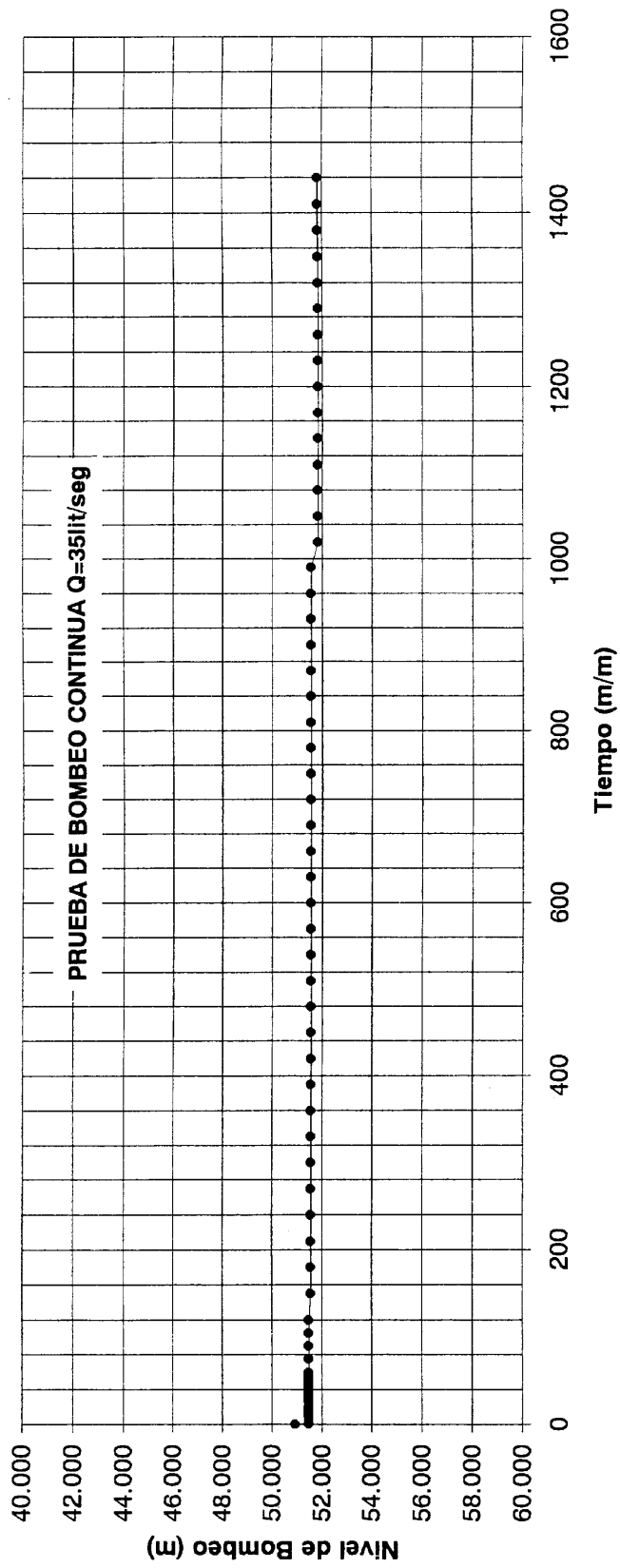
CAUDAL ESTIMADO PARA LA PRUEBA DE BOMBEO CONTINUA DE 35 LITROS POR SEGUNDO.

PRUEBA DE BOMBEO GRADUAL POZO PACAJA LA REINA ZONA 10



| | | | | |
|------------------|--|---------------------|-----------------|---------|
| ORIFICIO: | PRUEBA DE BOMBEO CONTINUA | LINEA DE AIRE A : | Sonda Electrica | PIES |
| NIVEL DE BOMBEO: | 51.83 Empresa Municipal De Agua Quetzaltenango | BOMBA INSTALADA A : | 576 | PIES |
| NIVEL ESTATICO: | 50.939 Propietario | PRODUCCION: | 38.5 | L.P.M. |
| EQUIPO: | Pozo Pacaja La Reina 2.10 Quetzaltenango | BOMBA USADA DE: 8 | ETAPAS: | 100 HP. |
| | Dirección | OPERADOR: | MANUEL AGUIRRE | |

| FECHA: | TIEMPO | | NIVEL EN | | NIVELES | | Abatimiento | PRODUCCION | | OBSERVACIONES |
|----------|--------|---------|----------|--------|----------|----------|-------------|--------------------|--|-------------------|
| | Hora | Minutos | Pies | Metros | Dinámico | Estático | | Litros Por segundo | | |
| 2004/2/5 | 6:22 | 0 | 167.08 | 50.939 | 0.00 | 50.939 | 0 | | | |
| | | 1 | 169.10 | 51.476 | 51.476 | | 0.54 | 35 | | |
| | | 2 | 169.10 | 51.476 | 51.476 | | 0.54 | 35 | | |
| | | 3 | 169.10 | 51.476 | 51.476 | | 0.54 | 35 | | |
| | | 4 | 169.10 | 51.476 | 51.476 | | 0.54 | 35 | | |
| | | 5 | 169.10 | 51.476 | 51.476 | | 0.54 | 35 | | PRUEBA DE LARGA |
| | | 6 | 169.10 | 51.476 | 51.476 | | 0.54 | 35 | | DURACION CONTINUA |
| | | 7 | 169.10 | 51.476 | 51.476 | | 0.54 | 35 | | |
| | | 8 | 169.10 | 51.476 | 51.476 | | 0.54 | 35 | | |
| | | 9 | 169.10 | 51.476 | 51.476 | | 0.54 | 35 | | |
| | | 10 | 169.10 | 51.476 | 51.476 | | 0.54 | 35 | | |
| | | 12 | 169.10 | 51.476 | 51.476 | | 0.54 | 35 | | |
| | | 14 | 169.10 | 51.476 | 51.476 | | 0.54 | 35 | | |
| | | 16 | 169.10 | 51.476 | 51.476 | | 0.54 | 35 | | |
| | | 18 | 169.10 | 51.476 | 51.476 | | 0.54 | 35 | | |
| | | 20 | 169.10 | 51.476 | 51.476 | | 0.54 | 35 | | |
| | | 25 | 169.10 | 51.476 | 51.476 | | 0.54 | 35 | | |
| | | 30 | 169.10 | 51.476 | 51.476 | | 0.54 | 35 | | |
| | | 35 | 169.10 | 51.476 | 51.476 | | 0.54 | 35 | | |
| | | 40 | 169.10 | 51.476 | 51.476 | | 0.54 | 35 | | |
| | | 45 | 169.10 | 51.476 | 51.476 | | 0.54 | 35 | | |
| | | 50 | 169.10 | 51.476 | 51.476 | | 0.54 | 35 | | |
| | | 55 | 169.10 | 51.476 | 51.476 | | 0.54 | 35 | | |
| | | 60 | 169.10 | 51.476 | 51.476 | | 0.54 | 35 | | |
| | | 75 | 169.10 | 51.476 | 51.476 | | 0.54 | 35 | | |
| | | 90 | 169.10 | 51.476 | 51.476 | | 0.54 | 35 | | |
| | | 105 | 169.10 | 51.476 | 51.476 | | 0.54 | 35 | | |
| | | 120 | 169.10 | 51.476 | 51.476 | | 0.54 | 35 | | |
| | | 150 | 169.10 | 51.555 | 51.555 | | 0.62 | 35 | | |
| | | 180 | 169.10 | 51.555 | 51.555 | | 0.62 | 35 | | |
| 2004/2/5 | | 210 | 169.10 | 51.555 | 51.555 | | 0.62 | 35 | | |
| | | 240 | 169.10 | 51.555 | 51.555 | | 0.62 | 35 | | |
| | | 270 | 169.10 | 51.555 | 51.555 | | 0.62 | 35 | | |
| | | 300 | 169.10 | 51.555 | 51.555 | | 0.62 | 35 | | |
| | | 330 | 169.10 | 51.555 | 51.555 | | 0.62 | 35 | | |
| | | 360 | 169.10 | 51.555 | 51.555 | | 0.62 | 35 | | |
| | | 390 | 169.10 | 51.555 | 51.555 | | 0.62 | 35 | | |
| | | 420 | 169.10 | 51.555 | 51.555 | | 0.62 | 35 | | |
| | | 450 | 169.10 | 51.555 | 51.555 | | 0.62 | 35 | | |
| | | 480 | 169.10 | 51.555 | 51.555 | | 0.62 | 35 | | |
| | | 510 | 169.10 | 51.555 | 51.555 | | 0.62 | 35 | | |
| | | 540 | 169.10 | 51.555 | 51.555 | | 0.62 | 35 | | |
| | | 570 | 169.10 | 51.555 | 51.555 | | 0.62 | 35 | | |
| | | 600 | 169.10 | 51.555 | 51.555 | | 0.62 | 35 | | |
| | | 630 | 169.11 | 51.558 | 51.558 | | 0.62 | 35 | | |
| | | 660 | 169.11 | 51.558 | 51.558 | | 0.62 | 35 | | |
| | | 690 | 169.11 | 51.558 | 51.558 | | 0.62 | 35 | | |
| | | 720 | 169.11 | 51.558 | 51.558 | | 0.62 | 35 | | |
| | | 750 | 169.11 | 51.558 | 51.558 | | 0.62 | 35 | | |
| | | 780 | 169.11 | 51.558 | 51.558 | | 0.62 | 35 | | |
| | | 810 | 169.11 | 51.558 | 51.558 | | 0.62 | 35 | | |
| | | 840 | 169.11 | 51.558 | 51.558 | | 0.62 | 35 | | |
| | | 870 | 169.11 | 51.558 | 51.558 | | 0.62 | 35 | | |
| | | 900 | 169.11 | 51.558 | 51.558 | | 0.62 | 35 | | |
| | | 930 | 169.11 | 51.558 | 51.558 | | 0.62 | 35 | | |
| | | 960 | 169.11 | 51.558 | 51.558 | | 0.62 | 35 | | |
| | | 990 | 169.11 | 51.558 | 51.558 | | 0.62 | 35 | | |
| | | 1020 | 170.00 | 51.829 | 51.829 | | 0.89 | 35 | | |
| | | 1050 | 170.00 | 51.829 | 51.829 | | 0.89 | 35 | | |
| 2004/2/6 | | 1080 | 170.00 | 51.829 | 51.829 | | 0.89 | 35 | | |
| | | 1110 | 170.00 | 51.829 | 51.829 | | 0.89 | 35 | | |
| | | 1140 | 170.00 | 51.829 | 51.829 | | 0.89 | 35 | | |
| | | 1170 | 170.00 | 51.829 | 51.829 | | 0.89 | 35 | | |
| | | 1200 | 170.00 | 51.829 | 51.829 | | 0.89 | 35 | | |
| | | 1230 | 170.00 | 51.829 | 51.829 | | 0.89 | 35 | | |
| | | 1260 | 170.00 | 51.829 | 51.829 | | 0.89 | 35 | | |
| | | 1290 | 170.00 | 51.829 | 51.829 | | 0.89 | 35 | | |
| | | 1320 | 170.00 | 51.829 | 51.829 | | 0.89 | 35 | | |
| | | 1350 | 170.00 | 51.829 | 51.829 | | 0.89 | 35 | | |
| | | 1380 | 170.00 | 51.829 | 51.829 | | 0.89 | 35 | | |
| | | 1410 | 170.00 | 51.829 | 51.829 | | 0.89 | 35 | | |
| | | 1440 | 170.00 | 51.829 | 51.829 | | 0.89 | 35 | | |



Pozo Zona 8

| ORIFICIO: | | MEDIDOR | PRUEBA DE BOMBEO GRADUAL | | | | LINEA DE AIRE A : | | 170.73 | PIES PIES G.P.M. HP. |
|------------------|-------|---------|--|--|----------|----------|---------------------|-------------------|-----------------|-------------------------------|
| NIVEL DE BOMBEO: | | 95.13 | Empresa Municipal De Agua Quetzaltenango | | | | BOMBA INSTALADA A : | | 175.60 | |
| NIVEL ESTATICO: | | | L-9 | Propietario | | | | PRODUCCION: | | 100 |
| EQUIPO: | | L-9 | | Colonia El Maestro Zona 8 Quetzaltenango | | | | BOMBA USADA DE: 8 | | |
| | | | | Dirección | | | | OPERADOR: | | |
| | | TIEMPO | | NIVEL EN | | NIVELES | | PRODUCCION | OBSERVACIONES | |
| FECHA: | Hora | Minutos | Pies | Metros | Dinámico | Estático | Abatimiento | ros Por segun | | |
| | 17.45 | 0 | 312.03 | 94.99 | 94.99 | 95.13 | 0 | | | |
| | | 1 | 320.09 | 97.44 | 97.44 | | 2.31 | 20 | PRIMER ESCALON | |
| | | 2 | 320.01 | 97.42 | 97.42 | | 2.29 | 20 | 20 LPS. | |
| | | 3 | 320.02 | 97.42 | 97.42 | | 2.29 | 20 | | |
| | | 4 | 320.03 | 97.42 | 97.42 | | 2.29 | 20 | | |
| | | 5 | 320.00 | 97.41 | 97.41 | | 2.28 | 20 | | |
| | | 6 | 321.05 | 97.73 | 97.73 | | 2.60 | 20 | | |
| | | 7 | 321.05 | 97.73 | 97.73 | | 2.60 | 20 | | |
| | | 8 | 321.05 | 97.73 | 97.73 | | 2.60 | 20 | | |
| | | 9 | 321.06 | 97.74 | 97.74 | | 2.61 | 20 | | |
| | | 10 | 321.06 | 97.74 | 97.74 | | 2.61 | 20 | | |
| | | 12 | 321.07 | 97.74 | 97.74 | | 2.61 | 20 | | |
| | | 14 | 321.08 | 97.74 | 97.74 | | 2.61 | 20 | | |
| | | 16 | 321.08 | 97.74 | 97.74 | | 2.61 | 20 | | |
| | | 18 | 321.09 | 97.74 | 97.74 | | 2.61 | 20 | | |
| | | 20 | 321.09 | 97.74 | 97.74 | | 2.61 | 20 | | |
| | | 25 | 321.09 | 97.74 | 97.74 | | 2.61 | 20 | | |
| | | 30 | 321.10 | 97.75 | 97.75 | | 2.62 | 20 | | |
| | | 35 | 322.00 | 98.02 | 98.02 | | 2.89 | 20 | | |
| | | 40 | 322.01 | 98.02 | 98.02 | | 2.89 | 20 | | |
| | | 45 | 322.02 | 98.03 | 98.03 | | 2.90 | 20 | | |
| | | 50 | 322.02 | 98.03 | 98.03 | | 2.90 | 20 | | |
| | | 55 | 322.02 | 98.03 | 98.03 | | 2.90 | 20 | | |
| | | 60 | 322.02 | 98.03 | 98.03 | | 2.90 | 20 | | |
| | | 75 | 322.02 | 98.03 | 98.03 | | 2.90 | 20 | | |
| | | 90 | 322.02 | 98.03 | 98.03 | | 2.90 | 20 | | |
| | | 105 | 322.02 | 98.03 | 98.03 | | 2.90 | 20 | | |
| | | 120 | 322.02 | 98.03 | 98.03 | | 2.90 | 20 | | |
| 2004/1/28 | | 1 | 325.01 | 99.09 | 99.09 | | 3.96 | 25 | SEGUNDO ESCALON | |
| | | 2 | 325.06 | 99.10 | 99.10 | | 3.97 | 25 | CON 25 LPS. | |
| | | 3 | 325.08 | 99.11 | 99.11 | | 3.98 | 25 | | |
| | | 4 | 325.09 | 99.11 | 99.11 | | 3.98 | 25 | | |
| | | 5 | 325.10 | 99.12 | 99.12 | | 3.99 | 25 | | |
| | | 6 | 325.11 | 99.12 | 99.12 | | 3.99 | 25 | | |
| | | 7 | 326.00 | 99.39 | 99.39 | | 4.26 | 25 | | |
| | | 8 | 326.01 | 99.39 | 99.39 | | 4.26 | 25 | | |
| | | 9 | 326.01 | 99.39 | 99.39 | | 4.26 | 25 | | |
| | | 10 | 326.01 | 99.39 | 99.39 | | 4.26 | 25 | | |
| | | 12 | 326.01 | 99.39 | 99.39 | | 4.26 | 25 | | |
| | | 14 | 326.01 | 99.39 | 99.39 | | 4.26 | 25 | | |
| | | 16 | 326.01 | 99.39 | 99.39 | | 4.26 | 25 | | |
| | | 18 | 326.01 | 99.39 | 99.39 | | 4.26 | 25 | | |
| | | 20 | 326.01 | 99.39 | 99.39 | | 4.26 | 25 | | |
| | | 25 | 326.02 | 99.40 | 99.40 | | 4.27 | 25 | | |
| | | 30 | 326.02 | 99.40 | 99.40 | | 4.27 | 25 | | |
| | | 35 | 326.03 | 99.40 | 99.40 | | 4.27 | 25 | | |
| | | 40 | 326.03 | 99.40 | 99.40 | | 4.27 | 25 | | |
| | | 45 | 326.03 | 99.40 | 99.40 | | 4.27 | 25 | | |
| | | 50 | 326.03 | 99.40 | 99.40 | | 4.27 | 25 | | |
| | | 55 | 326.03 | 99.40 | 99.40 | | 4.27 | 25 | | |
| | | 60 | 326.03 | 99.40 | 99.40 | | 4.27 | 25 | | |
| | | 75 | 326.04 | 99.40 | 99.40 | | 4.27 | 25 | | |
| | | 90 | 326.04 | 99.40 | 99.40 | | 4.27 | 25 | | |
| | | 105 | 326.04 | 99.40 | 99.40 | | 4.27 | 25 | | |
| | | 120 | 326.04 | 99.40 | 99.40 | | 4.27 | 25 | | |
| | | 1 | 329.11 | 100.34 | 100.34 | | 5.21 | 30 | TERCER ESCALON | |
| | | 2 | 329.11 | 100.34 | 100.34 | | 5.21 | 30 | CON 30 LPS. | |
| | | 3 | 329.11 | 100.34 | 100.34 | | 5.21 | 30 | | |
| | | 4 | 329.11 | 100.34 | 100.34 | | 5.21 | 30 | | |
| | | 5 | 329.11 | 100.34 | 100.34 | | 5.21 | 30 | | |
| | | 6 | 330.00 | 100.61 | 100.61 | | 5.48 | 30 | | |
| | | 7 | 330.01 | 100.61 | 100.61 | | 5.48 | 30 | | |
| | | 8 | 330.01 | 100.61 | 100.61 | | 5.48 | 30 | | |
| | | 9 | 330.02 | 100.62 | 100.62 | | 5.49 | 30 | | |
| | | 10 | 330.02 | 100.62 | 100.62 | | 5.49 | 30 | | |
| | | 12 | 330.02 | 100.62 | 100.62 | | 5.49 | 30 | | |
| | | 14 | 330.02 | 100.62 | 100.62 | | 5.49 | 30 | | |
| | | 16 | 330.02 | 100.62 | 100.62 | | 5.49 | 30 | | |
| | | 18 | 330.02 | 100.62 | 100.62 | | 5.49 | 30 | | |

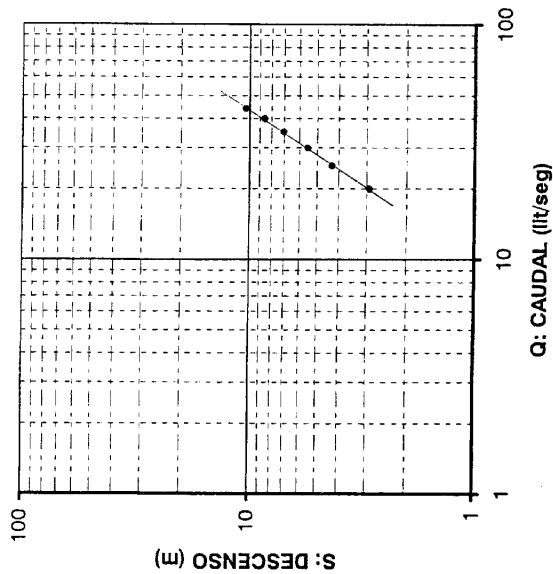
| | | | | | | | | | | |
|--|--|-----|--------|--------|--------|--|-------|----|--|-----------------|
| | | 20 | 330.02 | 100.62 | 100.62 | | 5.49 | 30 | | |
| | | 25 | 330.02 | 100.62 | 100.62 | | 5.49 | 30 | | |
| | | 30 | 330.02 | 100.62 | 100.62 | | 5.49 | 30 | | |
| | | 35 | 330.03 | 100.62 | 100.62 | | 5.49 | 30 | | |
| | | 40 | 330.03 | 100.62 | 100.62 | | 5.49 | 30 | | |
| | | 45 | 330.03 | 100.62 | 100.62 | | 5.49 | 30 | | |
| | | 50 | 330.03 | 100.62 | 100.62 | | 5.49 | 30 | | |
| | | 55 | 330.03 | 100.62 | 100.62 | | 5.49 | 30 | | |
| | | 60 | 330.03 | 100.62 | 100.62 | | 5.49 | 30 | | |
| | | 75 | 330.04 | 100.62 | 100.62 | | 5.49 | 30 | | |
| | | 90 | 330.04 | 100.62 | 100.62 | | 5.49 | 30 | | |
| | | 105 | 330.04 | 100.62 | 100.62 | | 5.49 | 30 | | |
| | | 120 | 330.04 | 100.62 | 100.62 | | 5.49 | 30 | | |
| | | 1 | 334.06 | 101.85 | 101.85 | | 6.72 | 35 | | CUARTO ESCALON |
| | | 2 | 334.08 | 101.85 | 101.85 | | 6.72 | 35 | | CON 30 LPS. |
| | | 3 | 334.09 | 101.86 | 101.86 | | 6.73 | 35 | | |
| | | 4 | 334.10 | 101.86 | 101.86 | | 6.73 | 35 | | |
| | | 5 | 334.11 | 101.86 | 101.86 | | 6.73 | 35 | | |
| | | 6 | 335.00 | 102.13 | 102.13 | | 7.00 | 35 | | |
| | | 7 | 335.00 | 102.13 | 102.13 | | 7.00 | 35 | | |
| | | 8 | 335.00 | 102.13 | 102.13 | | 7.00 | 35 | | |
| | | 9 | 335.00 | 102.13 | 102.13 | | 7.00 | 35 | | |
| | | 10 | 335.01 | 102.14 | 102.14 | | 7.01 | 35 | | |
| | | 12 | 335.02 | 102.14 | 102.14 | | 7.01 | 35 | | |
| | | 14 | 335.02 | 102.14 | 102.14 | | 7.01 | 35 | | |
| | | 16 | 335.02 | 102.14 | 102.14 | | 7.01 | 35 | | |
| | | 18 | 335.02 | 102.14 | 102.14 | | 7.01 | 35 | | |
| | | 20 | 335.03 | 102.14 | 102.14 | | 7.01 | 35 | | |
| | | 25 | 335.03 | 102.14 | 102.14 | | 7.01 | 35 | | |
| | | 30 | 335.03 | 102.14 | 102.14 | | 7.01 | 35 | | |
| | | 35 | 335.03 | 102.14 | 102.14 | | 7.01 | 35 | | |
| | | 40 | 335.03 | 102.14 | 102.14 | | 7.01 | 35 | | |
| | | 45 | 335.03 | 102.14 | 102.14 | | 7.01 | 35 | | |
| | | 50 | 335.03 | 102.14 | 102.14 | | 7.01 | 35 | | |
| | | 55 | 335.03 | 102.14 | 102.14 | | 7.01 | 35 | | |
| | | 60 | 335.04 | 102.15 | 102.15 | | 7.02 | 35 | | |
| | | 75 | 335.04 | 102.15 | 102.15 | | 7.02 | 35 | | |
| | | 90 | 335.05 | 102.15 | 102.15 | | 7.02 | 35 | | |
| | | 105 | 335.05 | 102.15 | 102.15 | | 7.02 | 35 | | |
| | | 120 | 335.05 | 102.15 | 102.15 | | 7.02 | 35 | | |
| | | 1 | 339.03 | 103.36 | 103.36 | | 8.23 | 40 | | QUINTO ESCALON |
| | | 2 | 339.04 | 103.37 | 103.37 | | 8.24 | 40 | | 40 LPS. |
| | | 3 | 339.05 | 103.37 | 103.37 | | 8.24 | 40 | | |
| | | 4 | 339.06 | 103.37 | 103.37 | | 8.24 | 40 | | |
| | | 5 | 339.07 | 103.38 | 103.38 | | 8.25 | 40 | | |
| | | 6 | 339.08 | 103.38 | 103.38 | | 8.25 | 40 | | |
| | | 7 | 339.09 | 103.38 | 103.38 | | 8.25 | 40 | | |
| | | 8 | 339.09 | 103.38 | 103.38 | | 8.25 | 40 | | |
| | | 9 | 339.09 | 103.38 | 103.38 | | 8.25 | 40 | | |
| | | 10 | 339.10 | 103.38 | 103.38 | | 8.25 | 40 | | |
| | | 12 | 339.10 | 103.38 | 103.38 | | 8.25 | 40 | | |
| | | 14 | 339.10 | 103.38 | 103.38 | | 8.25 | 40 | | |
| | | 16 | 339.10 | 103.38 | 103.38 | | 8.25 | 40 | | |
| | | 18 | 339.11 | 103.39 | 103.39 | | 8.26 | 40 | | AGUA TOTALMENTE |
| | | 20 | 339.11 | 103.39 | 103.39 | | 8.26 | 40 | | CLARA |
| | | 25 | 340.00 | 103.66 | 103.66 | | 8.53 | 40 | | NO ARENA |
| | | 30 | 340.00 | 103.66 | 103.66 | | 8.53 | 40 | | |
| | | 35 | 340.00 | 103.66 | 103.66 | | 8.53 | 40 | | |
| | | 40 | 340.00 | 103.66 | 103.66 | | 8.53 | 40 | | |
| | | 45 | 340.00 | 103.66 | 103.66 | | 8.53 | 40 | | |
| | | 50 | 340.00 | 103.66 | 103.66 | | 8.53 | 40 | | |
| | | 55 | 340.00 | 103.66 | 103.66 | | 8.53 | 40 | | |
| | | 60 | 340.00 | 103.66 | 103.66 | | 8.53 | 40 | | |
| | | 75 | 340.00 | 103.66 | 103.66 | | 8.53 | 40 | | |
| | | 90 | 340.01 | 103.66 | 103.66 | | 8.53 | 40 | | |
| | | 105 | 340.01 | 103.66 | 103.66 | | 8.53 | 40 | | |
| | | 120 | 340.01 | 103.66 | 103.66 | | 8.53 | 40 | | |
| | | 1 | 344.10 | 104.91 | 104.91 | | 9.78 | 44 | | SEXTO ESCALON |
| | | 2 | 344.11 | 104.91 | 104.91 | | 9.78 | 44 | | |
| | | 3 | 345.00 | 105.18 | 105.18 | | 10.05 | 44 | | |
| | | 4 | 345.01 | 105.19 | 105.19 | | 10.06 | 44 | | |
| | | 5 | 345.02 | 105.19 | 105.19 | | 10.06 | 44 | | |
| | | 6 | 345.03 | 105.19 | 105.19 | | 10.06 | 44 | | |
| | | 7 | 345.04 | 105.20 | 105.20 | | 10.07 | 44 | | |
| | | 8 | 345.05 | 105.20 | 105.20 | | 10.07 | 44 | | |
| | | 9 | 345.06 | 105.20 | 105.20 | | 10.07 | 44 | | |
| | | 10 | 345.07 | 105.20 | 105.20 | | 10.07 | 44 | | |
| | | 12 | 345.08 | 105.21 | 105.21 | | 10.08 | 44 | | |
| | | 14 | 345.08 | 105.21 | 105.21 | | 10.08 | 44 | | |
| | | 16 | 345.08 | 105.21 | 105.21 | | 10.08 | 44 | | |

| | | | | | | | | | | |
|--|--|-----|--------|--------|--------|--|-------|----|--|--|
| | | 18 | 345.09 | 105.21 | 105.21 | | 10.08 | 44 | | |
| | | 20 | 345.09 | 105.21 | 105.21 | | 10.08 | 44 | | |
| | | 25 | 345.11 | 105.22 | 105.22 | | 10.09 | 44 | | |
| | | 30 | 345.11 | 105.22 | 105.22 | | 10.09 | 44 | | |
| | | 35 | 345.11 | 105.22 | 105.22 | | 10.09 | 44 | | |
| | | 40 | 345.11 | 105.22 | 105.22 | | 10.09 | 44 | | |
| | | 45 | 345.11 | 105.22 | 105.22 | | 10.09 | 44 | | |
| | | 50 | 345.11 | 105.22 | 105.22 | | 10.09 | 44 | | |
| | | 55 | 345.11 | 105.22 | 105.22 | | 10.09 | 44 | | |
| | | 60 | 345.11 | 105.22 | 105.22 | | 10.09 | 44 | | |
| | | 75 | 346.00 | 105.49 | 105.49 | | 10.36 | 44 | | |
| | | 90 | 346.01 | 105.49 | 105.49 | | 10.36 | 44 | | |
| | | 105 | 346.01 | 105.49 | 105.49 | | 10.36 | 44 | | |
| | | 120 | 346.01 | 105.49 | 105.49 | | 10.36 | 44 | | |
| | | | | | | | | | | |
| | | | | | | | | | | |

ORIFICIO: MEDIDOR **RECUPERACION DE PRUEBA DE BOMBEO GRADUAL** LINEA DE AIF 170.73
 NIVEL DE BOMBEO: Empresa Municipal De Agua Quetzaltenango BOMBA INST 175.60
 NIVEL ESTATICO: 95.13 Propietario PRODUCCION:
 EQUIPO: L-9 Colonia El Maestro Zona 8 Quetzaltenango BOMBA USAIETAPAS:
 Dirección OPERADOR: VICENTE AGUIRRE

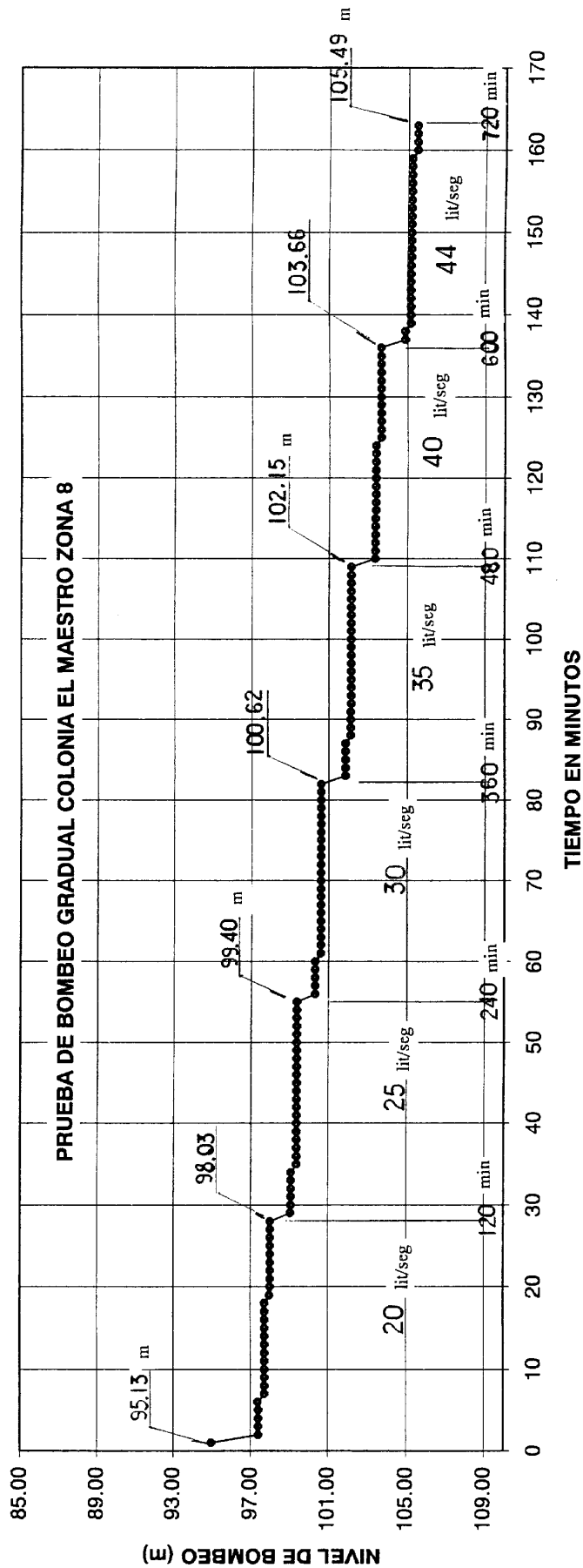
| FECHA: | TIEMPO | | NIVEL EN | | NIVELES | | Abatimiento | PRODUCCION ros Por segun | OBSERVACIONES |
|-----------|--------|---------|----------|--------|----------|----------|-------------|-----------------------------|---------------|
| | Hora | Minutos | Pies | Metros | Dinámico | Estático | | | |
| 2004/1/29 | | 1 | 319.01 | 97.26 | 97.26 | | 2.13 | | RECUPERACION |
| | | 2 | 317.01 | 96.65 | 96.65 | | 1.52 | | |
| | | 3 | 316.05 | 96.36 | 96.36 | | 1.23 | | |
| | | 4 | 315.08 | 96.06 | 96.06 | | 0.93 | | |
| | | 5 | 315.03 | 96.05 | 96.05 | | 0.92 | | |
| | | 6 | 314.10 | 95.76 | 95.76 | | 0.63 | | |
| | | 7 | 314.08 | 95.76 | 95.76 | | 0.63 | | |
| | | 8 | 314.06 | 95.75 | 95.75 | | 0.62 | | |
| | | 9 | 314.04 | 95.74 | 95.74 | | 0.61 | | |
| | | 10 | 314.03 | 95.74 | 95.74 | | 0.61 | | |
| | | 12 | 314.01 | 95.73 | 95.73 | | 0.60 | | |
| | | 14 | 313.10 | 95.46 | 95.46 | | 0.33 | | |
| | | 16 | 313.08 | 95.45 | 95.45 | | 0.32 | | |
| | | 18 | 313.07 | 95.45 | 95.45 | | 0.32 | | |
| | | 20 | 313.06 | 95.45 | 95.45 | | 0.32 | | |
| | | 25 | 313.01 | 95.43 | 95.43 | | 0.30 | | |
| | | 30 | 313.02 | 95.43 | 95.43 | | 0.30 | | |
| | | 35 | 313.01 | 95.43 | 95.43 | | 0.30 | | |
| | | 40 | 312.11 | 95.16 | 95.16 | | 0.03 | | |
| | | 45 | 312.11 | 95.16 | 95.16 | | 0.03 | | |
| | | 50 | 312.11 | 95.16 | 95.16 | | 0.03 | | |
| | | 55 | 312.10 | 95.15 | 95.15 | | 0.02 | | |
| | | 60 | 312.10 | 95.15 | 95.15 | | 0.02 | | |
| | | 75 | 312.09 | 95.15 | 95.15 | | 0.02 | | |
| | | 90 | 312.08 | 95.15 | 95.15 | | 0.02 | | |
| | | 105 | 312.06 | 95.14 | 95.14 | | 0.01 | | |
| | | 120 | 312.06 | 95.14 | 95.14 | | 0.01 | | |
| | | 135 | 312.06 | 95.14 | 95.14 | | 0.01 | | |
| | | 150 | 312.06 | 95.14 | 95.14 | | 0.01 | | |
| | | 165 | 312.06 | 95.14 | 95.14 | | 0.01 | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |

PRUEBA DE BOMBEO GRADUAL S-Q



| Escalon | Caudal Q (lit/seg) | Desenso s (m) |
|---------|--------------------|---------------|
| 1 | 20 | 2.9 |
| 2 | 25 | 4.27 |
| 3 | 30 | 5.49 |
| 4 | 35 | 7.02 |
| 5 | 40 | 8.53 |
| 6 | 44 | 10.36 |

CAUDAL ESTIMADO PARA LA PRUEBA DE BOMBEO CONTINUA DE 38.5 LITROS POR SEGUNDO



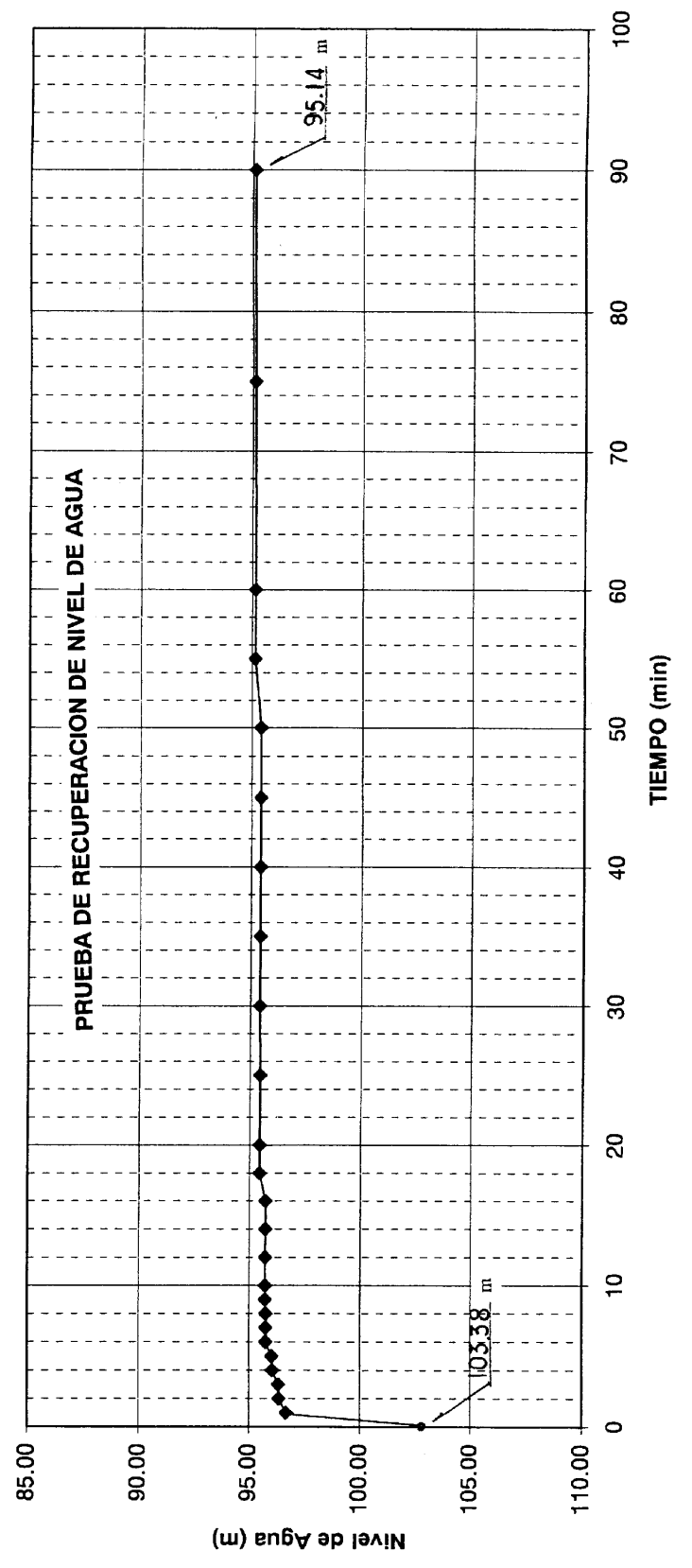
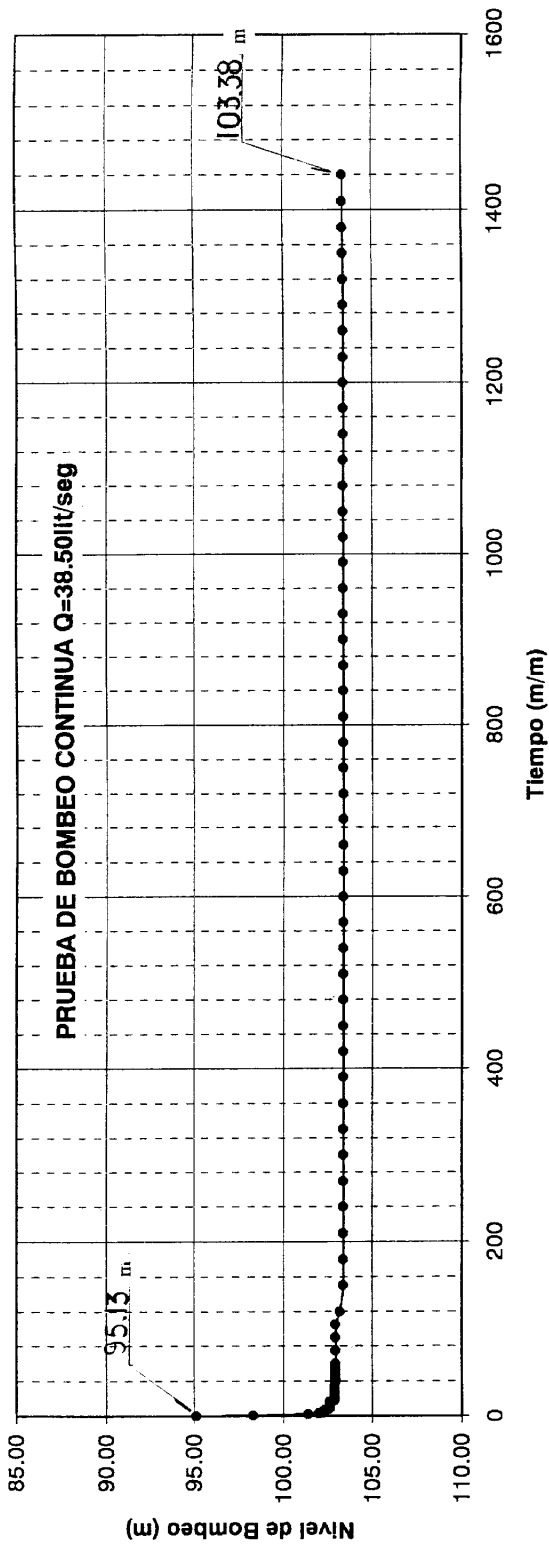
PRUEBA DE BOMBEO CONTINUA

| | | | |
|------------------|--|-----------------------------|-------------|
| NIVEL DE BOMBEO: | Empresa Municipal De Agua Quetzaltenango | LINEA DE AI Sonda Electrica | PIES |
| NIVEL ESTATICO: | 95.13 Propietario | BOMBA INS1 | 175.6 PIES |
| EQUIPO: | L-9 Colonia El Maestro Zona 8 Quetzaltenango | PRODUCCIC | 38.5 L.P.M. |
| | Dirección | BOMBA USA ETAPAS: | 100 HP. |
| | | OPERADOR: MANUEL AGUIRRE | |

| FECHA: | TIEMPO | | Pies | NIVEL EN Metros | NIVELES | | Abatimiento | PRODUCCION Litros Por segundo | OBSERVACIONES |
|-----------|--------|---------|--------|-----------------|----------|----------|-------------|-------------------------------|-----------------------------------|
| | Hora | Minutos | | | Dinámico | Estático | | | |
| 2004/1/29 | 9:03 | 0 | 312.06 | 95.13 | 0.00 | 95.13 | 0 | | |
| | | 1 | 323.00 | 98.33 | 98.33 | | 3.20 | 38.5 | |
| | | 2 | 333.10 | 101.40 | 101.40 | | 6.27 | 38.5 | |
| | | 3 | 335.06 | 102.00 | 102.00 | | 6.87 | 38.5 | |
| | | 4 | 336.00 | 102.28 | 102.28 | | 7.15 | 38.5 | |
| | | 5 | 336.06 | 102.30 | 102.30 | | 7.17 | 38.5 | |
| | | 6 | 336.09 | 102.31 | 102.31 | | 7.18 | 38.5 | PRUEBA DE LARGA DURACION CONTINUA |
| | | 7 | 336.11 | 102.32 | 102.32 | | 7.19 | 38.5 | |
| | | 8 | 337.01 | 102.59 | 102.59 | | 7.46 | 38.5 | |
| | | 9 | 337.03 | 102.60 | 102.60 | | 7.47 | 38.5 | |
| | | 10 | 337.05 | 102.60 | 102.60 | | 7.47 | 38.5 | |
| | | 12 | 337.07 | 102.61 | 102.61 | | 7.48 | 38.5 | |
| | | 14 | 337.09 | 102.61 | 102.61 | | 7.48 | 38.5 | |
| | | 16 | 337.11 | 102.62 | 102.62 | | 7.49 | 38.5 | |
| | | 18 | 338.00 | 102.89 | 102.89 | | 7.76 | 38.5 | |
| | | 20 | 338.01 | 102.89 | 102.89 | | 7.76 | 38.5 | |
| | | 25 | 338.02 | 102.90 | 102.90 | | 7.77 | 38.5 | |
| | | 30 | 338.05 | 102.91 | 102.91 | | 7.78 | 38.5 | |
| | | 35 | 338.06 | 102.91 | 102.91 | | 7.78 | 38.5 | |
| | | 40 | 338.07 | 102.91 | 102.91 | | 7.78 | 38.5 | |
| | | 45 | 338.08 | 102.92 | 102.92 | | 7.79 | 38.5 | |
| | | 50 | 338.09 | 102.92 | 102.92 | | 7.79 | 38.5 | |
| | | 55 | 338.10 | 102.92 | 102.92 | | 7.79 | 38.5 | |
| | 10:03 | 60 | 338.10 | 102.92 | 102.92 | | 7.79 | 38.5 | |
| | | 75 | 338.10 | 102.92 | 102.92 | | 7.79 | 38.5 | |
| | | 90 | 338.11 | 102.93 | 102.93 | | 7.80 | 38.5 | |
| | | 105 | 338.11 | 102.93 | 102.93 | | 7.80 | 38.5 | |
| | 11:03 | 120 | 339.00 | 103.20 | 103.20 | | 8.07 | 38.5 | |
| | | 150 | 339.00 | 103.35 | 103.35 | | 8.22 | 38.5 | |
| | 12:03 | 180 | 339.00 | 103.35 | 103.35 | | 8.22 | 38.5 | |
| 2004/1/29 | | 210 | 339.01 | 103.36 | 103.36 | | 8.23 | 38.5 | |
| | 13:03 | 240 | 339.02 | 103.36 | 103.36 | | 8.23 | 38.5 | |
| | | 270 | 339.02 | 103.36 | 103.36 | | 8.23 | 38.5 | |
| | 14:03 | 300 | 339.03 | 103.36 | 103.36 | | 8.23 | 38.5 | |
| | | 330 | 339.03 | 103.36 | 103.36 | | 8.23 | 38.5 | |
| | 15:03 | 360 | 339.03 | 103.36 | 103.36 | | 8.23 | 38.5 | |
| | | 390 | 339.03 | 103.36 | 103.36 | | 8.23 | 38.5 | |
| | 16:03 | 420 | 339.03 | 103.36 | 103.36 | | 8.23 | 38.5 | |
| | | 450 | 339.04 | 103.37 | 103.37 | | 8.24 | 38.5 | |
| | 17:03 | 480 | 339.04 | 103.37 | 103.37 | | 8.24 | 38.5 | |
| | | 510 | 339.04 | 103.37 | 103.37 | | 8.24 | 38.5 | |
| | 18:03 | 540 | 339.04 | 103.37 | 103.37 | | 8.24 | 38.5 | |
| | | 570 | 339.04 | 103.37 | 103.37 | | 8.24 | 38.5 | |
| | 19:03 | 600 | 339.04 | 103.37 | 103.37 | | 8.24 | 38.5 | |
| | | 630 | 339.05 | 103.37 | 103.37 | | 8.24 | 38.5 | |
| | 20:03 | 660 | 339.06 | 103.37 | 103.37 | | 8.24 | 38.5 | |
| | | 690 | 339.06 | 103.37 | 103.37 | | 8.24 | 38.5 | |
| | 21:03 | 720 | 339.06 | 103.37 | 103.37 | | 8.24 | 38.5 | |
| | | 750 | 339.07 | 103.38 | 103.38 | | 8.25 | 38.5 | |
| | 22:03 | 780 | 339.07 | 103.38 | 103.38 | | 8.25 | 38.5 | |
| | | 810 | 339.07 | 103.38 | 103.38 | | 8.25 | 38.5 | |
| | 23:03 | 840 | 339.08 | 103.38 | 103.38 | | 8.25 | 38.5 | |
| | | 870 | 339.08 | 103.38 | 103.38 | | 8.25 | 38.5 | |
| 2004/1/30 | 24:03 | 900 | 339.08 | 103.38 | 103.38 | | 8.25 | 38.5 | |
| | | 930 | 339.08 | 103.38 | 103.38 | | 8.25 | 38.5 | |
| | 1:03 | 960 | 339.08 | 103.38 | 103.38 | | 8.25 | 38.5 | |
| | | 990 | 339.08 | 103.38 | 103.38 | | 8.25 | 38.5 | |
| | 2:03 | 1020 | 339.08 | 103.38 | 103.38 | | 8.25 | 38.5 | |
| | | 1050 | 339.08 | 103.38 | 103.38 | | 8.25 | 38.5 | |
| | 3:03 | 1080 | 339.08 | 103.38 | 103.38 | | 8.25 | 38.5 | |
| | | 1110 | 339.08 | 103.38 | 103.38 | | 8.25 | 38.5 | |
| | 4:03 | 1140 | 339.08 | 103.38 | 103.38 | | 8.25 | 38.5 | |
| | | 1170 | 339.08 | 103.38 | 103.38 | | 8.25 | 38.5 | |
| | 5:03 | 1200 | 339.08 | 103.38 | 103.38 | | 8.25 | 38.5 | |
| | | 1230 | 339.08 | 103.38 | 103.38 | | 8.25 | 38.5 | |
| | 6:03 | 1260 | 339.08 | 103.38 | 103.38 | | 8.25 | 38.5 | |
| | | 1290 | 339.08 | 103.38 | 103.38 | | 8.25 | 38.5 | |
| | 7:03 | 1320 | 339.08 | 103.38 | 103.38 | | 8.25 | 38.5 | |
| | | 1350 | 339.08 | 103.38 | 103.38 | | 8.25 | 38.5 | |
| | 8:03 | 1380 | 339.08 | 103.38 | 103.38 | | 8.25 | 38.5 | |
| | | 1410 | 339.08 | 103.38 | 103.38 | | 8.25 | 38.5 | |
| | 9:03 | 1440 | 339.08 | 103.38 | 103.38 | | 8.25 | 38.5 | |

| | | |
|------------------------------|--|------------------------|
| ORIFICIO: _____ | PRUEBA DE RECUPERACION DE NIVEL DE AGUA | LINEA Sonda Elect PIES |
| NIVEL DE BOMBEO: _____ | Empresa Municipal De Agua Quetzaltenango | BOMB. 175.6 PIES |
| NIVEL ESTATICO: <u>95.13</u> | Propietario | PRODI 38.5 L.P.M. |
| EQUIPO: <u>L-9</u> | Colonia El Maestro Zona 8 Quetzaltenango | BOMB. ETAPAS # HP. |
| | Dirección | OPER. <u>MANUEL A</u> |

| FECHA: | TIEMPO | | NIVEL EN PIES | NIVEL EN METROS | NIVELES | | Abatimiento | PRODUCCION | OBSERVACIONES |
|--------|--------|---------|---------------|-----------------|----------|----------|-------------|--------------------|---------------|
| | Hora | Minutos | | | Dinámico | Estático | | Litros Por segundo | |
| | | 1 | 317.11 | 96.68 | 96.68 | 95.13 | 1.55 | | OPERACION |
| | | 2 | 316.11 | 96.38 | 96.38 | | 1.25 | | |
| | | 3 | 316.00 | 96.34 | 96.34 | | 1.21 | | |
| | | 4 | 315.06 | 96.05 | 96.05 | | 0.92 | | |
| | | 5 | 315.01 | 96.04 | 96.04 | | 0.91 | | |
| | | 6 | 314.10 | 95.76 | 95.76 | | 0.63 | | |
| | | 7 | 314.07 | 95.75 | 95.75 | | 0.62 | | |
| | | 8 | 314.07 | 95.75 | 95.75 | | 0.62 | | |
| | | 9 | 314.05 | 95.75 | 95.75 | | 0.62 | | |
| | | 10 | 314.04 | 95.74 | 95.74 | | 0.61 | | |
| | | 12 | 314.01 | 95.73 | 95.73 | | 0.60 | | |
| | | 14 | 314.00 | 95.73 | 95.73 | | 0.60 | | |
| | | 16 | 314.00 | 95.73 | 95.73 | | 0.60 | | |
| | | 18 | 313.09 | 95.45 | 95.45 | | 0.32 | | |
| | | 20 | 313.08 | 95.45 | 95.45 | | 0.32 | | |
| | | 25 | 313.07 | 95.45 | 95.45 | | 0.32 | | |
| | | 30 | 313.05 | 95.44 | 95.44 | | 0.31 | | |
| | | 35 | 313.04 | 95.44 | 95.44 | | 0.31 | | |
| | | 40 | 313.03 | 95.44 | 95.44 | | 0.31 | | |
| | | 45 | 313.02 | 95.43 | 95.43 | | 0.30 | | |
| | | 50 | 313.01 | 95.43 | 95.43 | | 0.30 | | |
| | | 55 | 312.11 | 95.16 | 95.16 | | 0.03 | | |
| | 10:03 | 60 | 312.08 | 95.15 | 95.15 | | 0.02 | | |
| | | 75 | 312.06 | 95.14 | 95.14 | | 0.01 | | |
| | 10:30 | 90 | 312.06 | 95.14 | 95.14 | | 0.01 | | |
| | | | | | | | | | |
| | | | | | | | | | |



Pozo Choqui Alto

| | | | |
|---|---------------------------------|------------------------|----------------|
| ORIFICIO: MEDIDOR | PRUEBA DE BOMBEO GRADUAL | LINEA DE AI Piesometro | PIES |
| NIVEL DE BOMBEO: Empresa Municipal De Agua Quetzaltenango | | BOMBA INST 124.39 | Mts. |
| NIVEL ESTATICO: 56.74 Propietario | | PRODUCCION: | G.P.M. |
| EQUIPO: L-9 Choqui Alto Zona 6 Quetzaltenango | | BOMBA USA ETAPAS: | 60 HP. |
| | Dirección | OPERADOR: | MANUEL AGUIRRE |

| FECHA: | TIEMPO | | NIVEL EN | | NIVELES | | Abatimiento | PRODUCCION | OBSERVACIONES |
|-----------|--------|---------|----------|--------|----------|----------|-------------|--------------------|--------------------------------|
| | Hora | Minutos | Pies | Metros | Dinámico | Estático | | Litros Por segundo | |
| 2004/2/15 | 6.45 | 0 | 186.11 | 56.74 | 0.00 | 56.74 | 0 | | |
| | | 1 | 195.02 | 59.46 | 59.46 | | 2.72 | 20 | PRIMER ESCALON 20 LPS. |
| | | 2 | 195.03 | 59.46 | 59.46 | | 2.72 | 20 | |
| | | 3 | 195.03 | 59.46 | 59.46 | | 2.72 | 20 | |
| | | 4 | 195.03 | 59.46 | 59.46 | | 2.72 | 20 | |
| | | 5 | 195.03 | 59.46 | 59.46 | | 2.72 | 20 | |
| | | 6 | 195.03 | 59.46 | 59.46 | | 2.72 | 20 | |
| | | 7 | 195.03 | 59.46 | 59.46 | | 2.72 | 20 | |
| | | 8 | 195.03 | 59.46 | 59.46 | | 2.72 | 20 | |
| | | 9 | 195.04 | 59.46 | 59.46 | | 2.72 | 20 | |
| | | 10 | 195.04 | 59.46 | 59.46 | | 2.72 | 20 | |
| | | 12 | 196.01 | 59.76 | 59.76 | | 3.02 | 20 | |
| | | 14 | 196.02 | 59.76 | 59.76 | | 3.02 | 20 | |
| | | 16 | 196.03 | 59.77 | 59.77 | | 3.03 | 20 | |
| | | 18 | 196.03 | 59.77 | 59.77 | | 3.03 | 20 | |
| | | 20 | 196.04 | 59.77 | 59.77 | | 3.03 | 20 | |
| | | 25 | 196.05 | 59.77 | 59.77 | | 3.03 | 20 | |
| | | 30 | 196.06 | 59.77 | 59.77 | | 3.03 | 20 | |
| | | 35 | 196.07 | 59.78 | 59.78 | | 3.04 | 20 | |
| | | 40 | 196.08 | 59.78 | 59.78 | | 3.04 | 20 | |
| | | 45 | 196.09 | 59.78 | 59.78 | | 3.04 | 20 | |
| | | 50 | 196.09 | 59.78 | 59.78 | | 3.04 | 20 | |
| | | 55 | 196.09 | 59.78 | 59.78 | | 3.04 | 20 | |
| | | 60 | 196.10 | 59.79 | 59.79 | | 3.05 | 20 | |
| | | 75 | 196.11 | 59.79 | 59.79 | | 3.05 | 20 | |
| | | 90 | 196.11 | 59.79 | 59.79 | | 3.05 | 20 | |
| | | 105 | 196.11 | 59.79 | 59.79 | | 3.05 | 20 | |
| | | 120 | 196.11 | 59.79 | 59.79 | | 3.05 | 20 | |
| 2004/2/15 | | 1 | 199.01 | 60.67 | 60.67 | | 3.93 | 25 | SEGUNDO ESCALON CON 25 LPS. |
| | | 2 | 199.02 | 60.68 | 60.68 | | 3.94 | 25 | |
| | | 3 | 199.04 | 60.68 | 60.68 | | 3.94 | 25 | |
| | | 4 | 199.05 | 60.69 | 60.69 | | 3.95 | 25 | |
| | | 5 | 199.05 | 60.69 | 60.69 | | 3.95 | 25 | |
| | | 6 | 199.05 | 60.69 | 60.69 | | 3.95 | 25 | |
| | | 7 | 199.05 | 60.69 | 60.69 | | 3.95 | 25 | |
| | | 8 | 199.05 | 60.69 | 60.69 | | 3.95 | 25 | |
| | | 9 | 199.06 | 60.69 | 60.69 | | 3.95 | 25 | |
| | | 10 | 199.06 | 60.69 | 60.69 | | 3.95 | 25 | |
| | | 12 | 199.06 | 60.69 | 60.69 | | 3.95 | 25 | |
| | | 14 | 199.06 | 60.69 | 60.69 | | 3.95 | 25 | |
| | | 16 | 199.07 | 60.69 | 60.69 | | 3.95 | 25 | |
| | | 18 | 199.07 | 60.69 | 60.69 | | 3.95 | 25 | |
| | | 20 | 199.07 | 60.69 | 60.69 | | 3.95 | 25 | |
| | | 25 | 199.07 | 60.69 | 60.69 | | 3.95 | 25 | |
| | | 30 | 199.07 | 60.69 | 60.69 | | 3.95 | 25 | |
| | | 35 | 199.07 | 60.69 | 60.69 | | 3.95 | 25 | |
| | | 40 | 199.08 | 60.70 | 60.70 | | 3.96 | 25 | |
| | | 45 | 199.08 | 60.70 | 60.70 | | 3.96 | 25 | |
| | | 50 | 199.08 | 60.70 | 60.70 | | 3.96 | 25 | |
| | | 55 | 199.08 | 60.70 | 60.70 | | 3.96 | 25 | |
| | | 60 | 199.08 | 60.70 | 60.70 | | 3.96 | 25 | |
| | | 75 | 199.09 | 60.70 | 60.70 | | 3.96 | 25 | |
| | | 90 | 199.09 | 60.70 | 60.70 | | 3.96 | 25 | |
| | | 105 | 199.09 | 60.70 | 60.70 | | 3.96 | 25 | |
| | | 120 | 199.09 | 60.70 | 60.70 | | 3.96 | 25 | |
| 2004/2/15 | | 1 | 202.01 | 61.59 | 61.59 | | 4.85 | 30 | TERCER ESCALON 30 LTS. |
| | | 2 | 202.02 | 61.59 | 61.59 | | 4.85 | 30 | |
| | | 3 | 202.03 | 61.59 | 61.59 | | 4.85 | 30 | |
| | | 4 | 202.03 | 61.59 | 61.59 | | 4.85 | 30 | |
| | | 5 | 202.04 | 61.60 | 61.60 | | 4.86 | 30 | |
| | | 6 | 202.04 | 61.60 | 61.60 | | 4.86 | 30 | |
| | | 7 | 202.04 | 61.60 | 61.60 | | 4.86 | 30 | |
| | | 8 | 202.04 | 61.60 | 61.60 | | 4.86 | 30 | |
| | | 9 | 202.04 | 61.60 | 61.60 | | 4.86 | 30 | |
| | | 10 | 202.04 | 61.60 | 61.60 | | 4.86 | 30 | |
| | | 12 | 202.04 | 61.60 | 61.60 | | 4.86 | 30 | |
| | | 14 | 202.04 | 61.60 | 61.60 | | 4.86 | 30 | |
| | | 16 | 202.05 | 61.60 | 61.60 | | 4.86 | 30 | |
| | | 18 | 202.05 | 61.60 | 61.60 | | 4.86 | 30 | |
| | | 20 | 202.05 | 61.60 | 61.60 | | 4.86 | 30 | |
| | | 25 | 202.05 | 61.60 | 61.60 | | 4.86 | 30 | |
| | | 30 | 202.06 | 61.60 | 61.60 | | 4.86 | 30 | |

| | | | | | | | | | |
|-----------|--|-----|--------|-------|-------|--|------|----|----------------|
| | | 35 | 202.06 | 61.60 | 61.60 | | 4.86 | 30 | |
| | | 40 | 202.06 | 61.60 | 61.60 | | 4.86 | 30 | |
| | | 45 | 202.07 | 61.61 | 61.61 | | 4.87 | 30 | |
| | | 50 | 202.07 | 61.61 | 61.61 | | 4.87 | 30 | |
| | | 55 | 202.07 | 61.61 | 61.61 | | 4.87 | 30 | |
| | | 60 | 202.07 | 61.61 | 61.61 | | 4.87 | 30 | |
| | | 75 | 202.07 | 61.61 | 61.61 | | 4.87 | 30 | |
| | | 90 | 202.08 | 61.61 | 61.61 | | 4.87 | 30 | |
| | | 105 | 202.08 | 61.61 | 61.61 | | 4.87 | 30 | |
| | | 120 | 202.08 | 61.61 | 61.61 | | 4.87 | 30 | |
| 2004/2/15 | | 1 | 205.00 | 62.50 | 62.50 | | 5.76 | 35 | CUARTO ESCALON |
| | | 2 | 205.03 | 62.51 | 62.51 | | 5.77 | 35 | CON 35 LPS. |
| | | 3 | 205.03 | 62.51 | 62.51 | | 5.77 | 35 | |
| | | 4 | 205.03 | 62.51 | 62.51 | | 5.77 | 35 | |
| | | 5 | 205.04 | 62.51 | 62.51 | | 5.77 | 35 | |
| | | 6 | 205.05 | 62.52 | 62.52 | | 5.78 | 35 | |
| | | 7 | 205.06 | 62.52 | 62.52 | | 5.78 | 35 | |
| | | 8 | 205.06 | 62.52 | 62.52 | | 5.78 | 35 | |
| | | 9 | 205.06 | 62.52 | 62.52 | | 5.78 | 35 | |
| | | 10 | 205.06 | 62.52 | 62.52 | | 5.78 | 35 | |
| | | 12 | 205.07 | 62.52 | 62.52 | | 5.78 | 35 | |
| | | 14 | 205.07 | 62.52 | 62.52 | | 5.78 | 35 | |
| | | 16 | 205.07 | 62.52 | 62.52 | | 5.78 | 35 | |
| | | 18 | 205.07 | 62.52 | 62.52 | | 5.78 | 35 | |
| | | 20 | 205.08 | 62.52 | 62.52 | | 5.78 | 35 | |
| | | 25 | 205.08 | 62.52 | 62.52 | | 5.78 | 35 | |
| | | 30 | 205.08 | 62.52 | 62.52 | | 5.78 | 35 | |
| | | 35 | 205.08 | 62.52 | 62.52 | | 5.78 | 35 | |
| | | 40 | 205.08 | 62.52 | 62.52 | | 5.78 | 35 | |
| | | 45 | 205.08 | 62.52 | 62.52 | | 5.78 | 35 | |
| | | 50 | 205.09 | 62.53 | 62.53 | | 5.79 | 35 | |
| | | 55 | 205.09 | 62.53 | 62.53 | | 5.79 | 35 | |
| | | 60 | 205.09 | 62.53 | 62.53 | | 5.79 | 35 | |
| | | 75 | 205.10 | 62.53 | 62.53 | | 5.79 | 35 | |
| | | 90 | 205.10 | 62.53 | 62.53 | | 5.79 | 35 | |
| | | 105 | 205.10 | 62.53 | 62.53 | | 5.79 | 35 | |
| | | 120 | 205.10 | 62.53 | 62.53 | | 5.79 | 35 | |
| 2004/2/15 | | 1 | 208.06 | 63.43 | 63.43 | | 6.69 | 40 | QUINTO ESCALON |
| | | 2 | 208.08 | 63.44 | 63.44 | | 6.70 | 40 | 40 LPS. |
| | | 3 | 208.09 | 63.44 | 63.44 | | 6.70 | 40 | |
| | | 4 | 208.09 | 63.44 | 63.44 | | 6.70 | 40 | |
| | | 5 | 208.10 | 63.45 | 63.45 | | 6.71 | 40 | |
| | | 6 | 208.11 | 63.45 | 63.45 | | 6.71 | 40 | |
| | | 7 | 208.11 | 63.45 | 63.45 | | 6.71 | 40 | |
| | | 8 | 208.11 | 63.45 | 63.45 | | 6.71 | 40 | |
| | | 9 | 208.11 | 63.45 | 63.45 | | 6.71 | 40 | |
| | | 10 | 208.11 | 63.45 | 63.45 | | 6.71 | 40 | |
| | | 12 | 209.00 | 63.72 | 63.72 | | 6.98 | 40 | |
| | | 14 | 209.00 | 63.72 | 63.72 | | 6.98 | 40 | |
| | | 16 | 209.00 | 63.72 | 63.72 | | 6.98 | 40 | |
| | | 18 | 209.01 | 63.72 | 63.72 | | 6.98 | 40 | |
| | | 20 | 209.01 | 63.72 | 63.72 | | 6.98 | 40 | |
| | | 25 | 209.01 | 63.72 | 63.72 | | 6.98 | 40 | |
| | | 30 | 209.01 | 63.72 | 63.72 | | 6.98 | 40 | |
| | | 35 | 209.01 | 63.72 | 63.72 | | 6.98 | 40 | |
| | | 40 | 209.01 | 63.72 | 63.72 | | 6.98 | 40 | |
| | | 45 | 209.01 | 63.72 | 63.72 | | 6.98 | 40 | |
| | | 50 | 209.02 | 63.73 | 63.73 | | 6.99 | 40 | |
| | | 55 | 209.02 | 63.73 | 63.73 | | 6.99 | 40 | |
| | | 60 | 209.02 | 63.73 | 63.73 | | 6.99 | 40 | |
| | | 75 | 209.03 | 63.73 | 63.73 | | 6.99 | 40 | |
| | | 90 | 209.03 | 63.73 | 63.73 | | 6.99 | 40 | |
| | | 105 | 209.04 | 63.73 | 63.73 | | 6.99 | 40 | |
| | | 120 | 209.04 | 63.73 | 63.73 | | 6.99 | 40 | |
| 2004/2/15 | | 1 | 211.05 | 64.34 | 64.34 | | 7.60 | 44 | SEXTO ESCALON |
| | | 2 | 211.07 | 64.35 | 64.35 | | 7.61 | 44 | 44 LPS. |
| | | 3 | 211.07 | 64.35 | 64.35 | | 7.61 | 44 | |
| | | 4 | 211.07 | 64.35 | 64.35 | | 7.61 | 44 | |
| | | 5 | 211.08 | 64.35 | 64.35 | | 7.61 | 44 | |
| | | 6 | 211.09 | 64.36 | 64.36 | | 7.62 | 44 | |
| | | 7 | 211.09 | 64.36 | 64.36 | | 7.62 | 44 | |
| | | 8 | 211.09 | 64.36 | 64.36 | | 7.62 | 44 | |
| | | 9 | 211.09 | 64.36 | 64.36 | | 7.62 | 44 | |
| | | 10 | 211.09 | 64.36 | 64.36 | | 7.62 | 44 | |
| | | 12 | 211.09 | 64.36 | 64.36 | | 7.62 | 44 | |
| | | 14 | 211.10 | 64.36 | 64.36 | | 7.62 | 44 | |
| | | 16 | 212.00 | 64.63 | 64.63 | | 7.89 | 44 | |
| | | 18 | 212.01 | 64.64 | 64.64 | | 7.90 | 44 | |
| | | 20 | 212.02 | 64.64 | 64.64 | | 7.90 | 44 | |
| | | 25 | 212.03 | 64.64 | 64.64 | | 7.90 | 44 | |
| | | 30 | 212.03 | 64.64 | 64.64 | | 7.90 | 44 | |
| | | 35 | 212.03 | 64.64 | 64.64 | | 7.90 | 44 | |
| | | 40 | 212.04 | 64.65 | 64.65 | | 7.91 | 44 | |

| | | | | | | | | | |
|--|--|-----|--------|-------|-------|--|------|----|--|
| | | 45 | 212.04 | 64.65 | 64.65 | | 7.91 | 44 | |
| | | 50 | 212.04 | 64.65 | 64.65 | | 7.91 | 44 | |
| | | 55 | 212.04 | 64.65 | 64.65 | | 7.91 | 44 | |
| | | 60 | 212.05 | 64.65 | 64.65 | | 7.91 | 44 | |
| | | 75 | 212.06 | 64.65 | 64.65 | | 7.91 | 44 | |
| | | 90 | 212.06 | 64.65 | 64.65 | | 7.91 | 44 | |
| | | 105 | 212.06 | 64.65 | 64.65 | | 7.91 | 44 | |
| | | 120 | 212.06 | 64.65 | 64.65 | | 7.91 | 44 | |
| | | | | | | | | | |

RECUPERACION PRUEBA DE BOMBEO GRADUAL

ORIFICIO: MEDIDOR LINEA DE AIRE A : Piesor PIES

NIVEL DE BOMBEO: _____ Empresa Municipal De Agua Quetzaltenango BOMBA INSTALADA 124 Mts.

NIVEL ESTATICO: 56.74 Propietario PRODUCCION: _____ G.P.M.

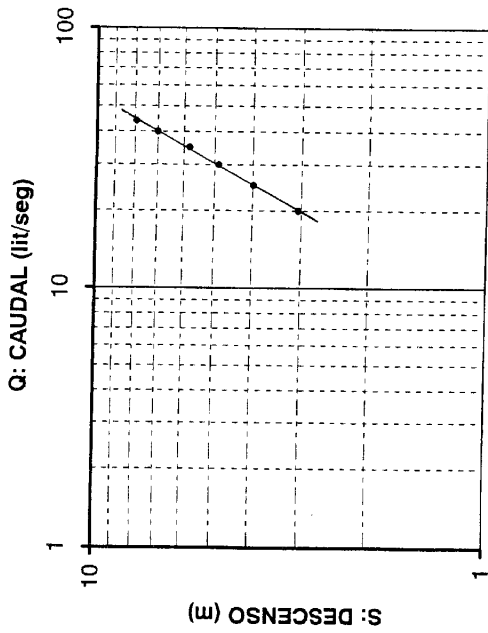
EQUIPO: L-9 Choquiailto Zona 6 Quetzaltenango BOMBA USADA DE: ETAP. 60 HP.

Dirección

OPERADOR: _____
MANUEL AGUIRRE

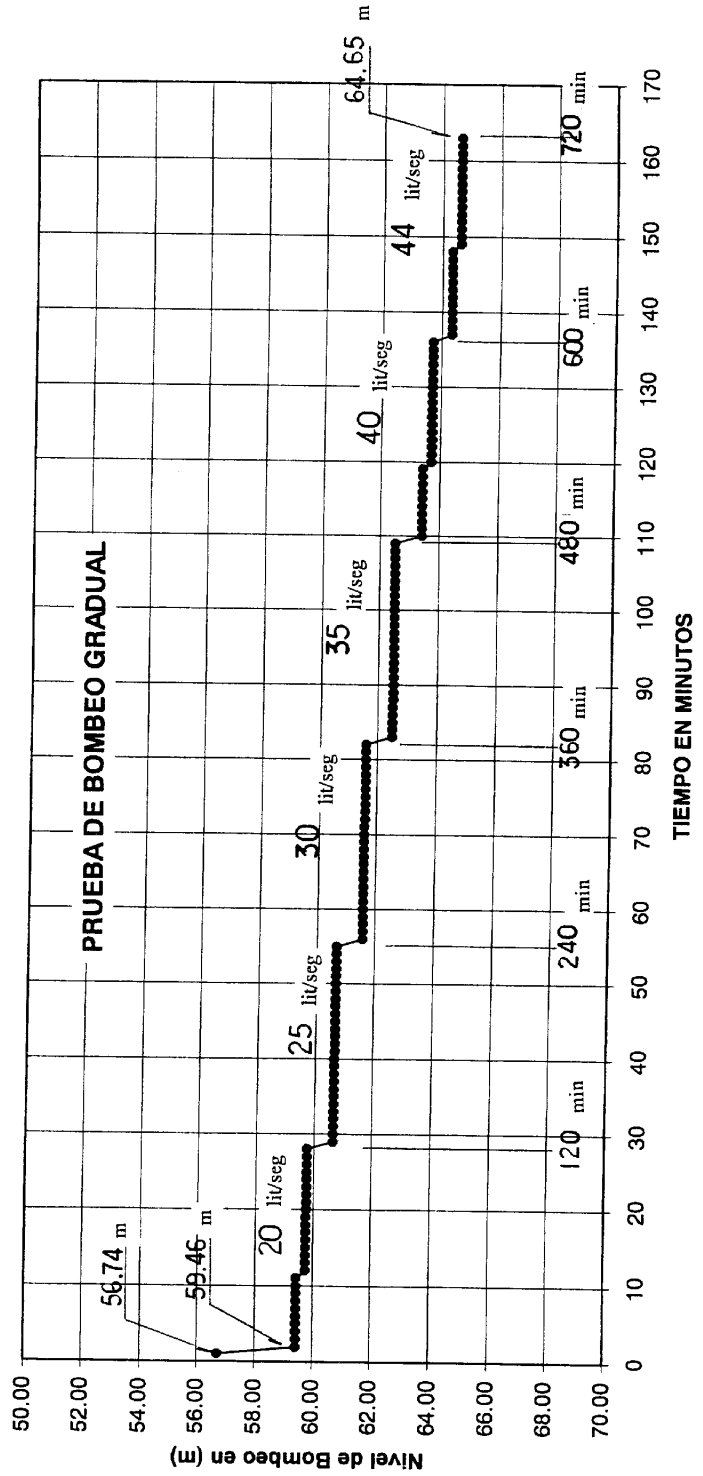
| FECHA: | TIEMPO | | NIVEL EN | | NIVELES | | Abatimiento | PRODUCCION | OBSERVACIONES |
|-----------|--------|---------|----------|--------|----------|----------|-------------|--------------------|---------------|
| | Hora | Minutos | Pies | Metros | Dinámico | Estático | | Litros Por segundo | |
| 2004/2/15 | | 1 | 190.02 | 57.93 | 57.93 | | 1.19 | | RECUPERACION |
| | | 2 | 190.01 | 57.93 | 57.93 | | 1.19 | | |
| | | 3 | 189.07 | 57.64 | 57.64 | | 0.90 | | |
| | | 4 | 189.05 | 57.64 | 57.64 | | 0.90 | | |
| | | 5 | 189.04 | 57.63 | 57.63 | | 0.89 | | |
| | | 6 | 189.03 | 57.63 | 57.63 | | 0.89 | | |
| | | 7 | 189.02 | 57.63 | 57.63 | | 0.89 | | |
| | | 8 | 188.11 | 57.35 | 57.35 | | 0.61 | | |
| | | 9 | 188.11 | 57.35 | 57.35 | | 0.61 | | |
| | | 10 | 188.10 | 57.35 | 57.35 | | 0.61 | | |
| | | 12 | 188.10 | 57.35 | 57.35 | | 0.61 | | |
| | | 14 | 188.07 | 57.34 | 57.34 | | 0.60 | | |
| | | 16 | 188.06 | 57.34 | 57.34 | | 0.60 | | |
| | | 18 | 188.05 | 57.33 | 57.33 | | 0.59 | | |
| | | 20 | 188.04 | 57.33 | 57.33 | | 0.59 | | |
| | | 25 | 188.02 | 57.32 | 57.32 | | 0.58 | | |
| | | 30 | 188.00 | 57.32 | 57.32 | | 0.58 | | |
| | | 35 | 187.11 | 57.05 | 57.05 | | 0.31 | | |
| | | 40 | 187.10 | 57.04 | 57.04 | | 0.30 | | |
| | | 45 | 187.08 | 57.04 | 57.04 | | 0.30 | | |
| | | 50 | 187.08 | 57.04 | 57.04 | | 0.30 | | |
| | | 55 | 187.08 | 57.04 | 57.04 | | 0.30 | | |
| | | 60 | 187.07 | 57.03 | 57.03 | | 0.29 | | |
| | | 75 | 187.06 | 57.03 | 57.03 | | 0.29 | | |
| | | 90 | 187.06 | 57.03 | 57.03 | | 0.29 | | |
| | | 105 | 187.04 | 57.02 | 57.02 | | 0.28 | | |
| | | 120 | 187.04 | 57.02 | 57.02 | | 0.28 | | |
| | | 150 | 187.04 | 57.02 | 57.02 | | 0.28 | | |
| | | 180 | 187.04 | 57.02 | 57.02 | | 0.28 | | |
| | | | | | | | | | |

PRUEBA DE BOMBEO GRADUAL S-Q



| Escalón | Caudal Q (lit/seg) | Desenso s (m) |
|---------|--------------------|---------------|
| 1 | 20 | 3.05 |
| 2 | 25 | 3.96 |
| 3 | 30 | 4.87 |
| 4 | 35 | 5.79 |
| 5 | 40 | 6.99 |
| 6 | 44 | 7.91 |

CAUDAL ESTIMADO PARA LA PRUEBA DE BOMBEO CONTINUA DE 36 LITROS POR SEGUNDO.



| | | | | | |
|------------------|---------|--|-------------------|----------------|--------|
| ORIFICIO: | MEDIDOR | PRUEBA DE BOMBEO CONTINUA | LÍNEA DE AI | Piesometro | PIES |
| NIVEL DE BOMBEO: | | Empresa Municipal De Agua Quetzaltenango | BOMBA INST | 124.39 | mts. |
| NIVEL ESTÁTICO: | 57.01 | Propietario | PRODUCCIC | | L.P.M. |
| EQUIPO: | L-9 | Choquialto Zona 6 Quetzaltenango | BOMBA USA ETAPAS: | | 60 HP. |
| | | Dirección | OPERADOR: | MANUEL AGUIRRE | |

| FECHA: | TIEMPO | | NIVEL EN | NIVELES | | Abatimiento | PRODUCCION | | OBSERVACIONES |
|-----------|--------|---------|----------|---------|--------|-------------|------------|----------|---------------|
| | Hora | Minutos | | Pies | Metros | | Dinámico | Estático | |
| 2004/2/17 | 11:21 | 0 | 187.00 | 57.01 | 0.00 | 57.01 | 0 | 36 | |
| | | 1 | 202.08 | 61.61 | 61.61 | | 4.60 | | |
| | | 2 | 202.11 | 61.62 | 61.62 | | 4.61 | | |
| | | 3 | 203.00 | 61.89 | 61.89 | | 4.88 | | |
| | | 4 | 203.03 | 61.90 | 61.90 | | 4.89 | | |
| | | 5 | 203.06 | 61.91 | 61.91 | | 4.90 | | |
| | | 6 | 203.08 | 61.91 | 61.91 | | 4.90 | | |
| | | 7 | 203.11 | 61.92 | 61.92 | | 4.91 | | |
| | | 8 | 204.00 | 62.20 | 62.20 | | 5.19 | | |
| | | 9 | 204.01 | 62.20 | 62.20 | | 5.19 | | |
| | | 10 | 204.02 | 62.20 | 62.20 | | 5.19 | | |
| | | 12 | 204.02 | 62.20 | 62.20 | | 5.19 | | |
| | | 14 | 204.04 | 62.21 | 62.21 | | 5.20 | | |
| | | 16 | 204.05 | 62.21 | 62.21 | | 5.20 | | |
| | | 18 | 204.06 | 62.21 | 62.21 | | 5.20 | | |
| | | 20 | 205.00 | 62.50 | 62.50 | | 5.49 | | |
| | | 25 | 205.02 | 62.51 | 62.51 | | 5.50 | | |
| | | 30 | 205.04 | 62.51 | 62.51 | | 5.50 | | |
| | | 35 | 205.04 | 62.51 | 62.51 | | 5.50 | | |
| | | 40 | 205.08 | 62.52 | 62.52 | | 5.51 | | |
| | | 45 | 205.08 | 62.52 | 62.52 | | 5.51 | | |
| | | 50 | 205.08 | 62.52 | 62.52 | | 5.51 | | |
| | | 55 | 205.09 | 62.53 | 62.53 | | 5.52 | | |
| | | 60 | 205.09 | 62.53 | 62.53 | | 5.52 | | |
| | | 75 | 205.10 | 62.53 | 62.53 | | 5.52 | | |
| | | 90 | 205.11 | 62.53 | 62.53 | | 5.52 | | |
| | | 105 | 205.11 | 62.53 | 62.53 | | 5.52 | | |
| | | 120 | 206.00 | 62.80 | 62.80 | | 5.79 | | |
| 2004/2/17 | | 150 | 206.01 | 62.81 | 62.81 | | 5.80 | | |
| | | 180 | 206.01 | 62.81 | 62.81 | | 5.80 | | |
| | | 210 | 206.01 | 62.81 | 62.81 | | 5.80 | | |
| | | 240 | 206.02 | 62.81 | 62.81 | | 5.80 | | |
| | | 270 | 206.06 | 62.82 | 62.82 | | 5.81 | | |
| | | 300 | 206.06 | 62.82 | 62.82 | | 5.81 | | |
| | | 330 | 206.07 | 62.83 | 62.83 | | 5.82 | | |
| | | 360 | 206.08 | 62.83 | 62.83 | | 5.82 | | |
| | | 390 | 206.08 | 62.83 | 62.83 | | 5.82 | | |
| | | 420 | 206.08 | 62.83 | 62.83 | | 5.82 | | |
| | | 450 | 206.08 | 62.83 | 62.83 | | 5.82 | | |
| | | 480 | 206.08 | 62.83 | 62.83 | | 5.82 | | |
| | | 510 | 206.08 | 62.83 | 62.83 | | 5.82 | | |
| | | 540 | 206.08 | 62.83 | 62.83 | | 5.82 | | |
| | | 570 | 206.08 | 62.83 | 62.83 | | 5.82 | | |
| | | 600 | 206.08 | 62.83 | 62.83 | | 5.82 | | |
| | | 630 | 206.08 | 62.83 | 62.83 | | 5.82 | | |
| | | 660 | 206.09 | 62.83 | 62.83 | | 5.82 | | |
| | | 690 | 206.09 | 62.83 | 62.83 | | 5.82 | | |
| | | 720 | 206.09 | 62.83 | 62.83 | | 5.82 | | |
| | | 750 | 206.09 | 62.83 | 62.83 | | 5.82 | | |
| | | 780 | 206.09 | 62.83 | 62.83 | | 5.82 | | |
| | | 810 | 206.10 | 62.84 | 62.84 | | 5.83 | | |
| | | 840 | 206.10 | 62.84 | 62.84 | | 5.83 | | |
| | | 870 | 206.11 | 62.84 | 62.84 | | 5.83 | | |
| | | 900 | 206.11 | 62.84 | 62.84 | | 5.83 | | |
| | | 930 | 206.11 | 62.84 | 62.84 | | 5.83 | | |
| | | 960 | 206.11 | 62.84 | 62.84 | | 5.83 | | |
| | | 990 | 206.11 | 62.84 | 62.84 | | 5.83 | | |
| | | 1020 | 206.11 | 62.84 | 62.84 | | 5.83 | | |
| | | 1050 | 206.11 | 62.84 | 62.84 | | 5.83 | | |
| | | 1080 | 206.11 | 62.84 | 62.84 | | 5.83 | | |
| | | 1110 | 206.11 | 62.84 | 62.84 | | 5.83 | | |
| | | 1140 | 206.11 | 62.84 | 62.84 | | 5.83 | | |
| | | 1170 | 206.11 | 62.84 | 62.84 | | 5.83 | | |
| | | 1200 | 206.11 | 62.84 | 62.84 | | 5.83 | | |
| | | 1230 | 206.11 | 62.84 | 62.84 | | 5.83 | | |
| | | 1260 | 206.11 | 62.84 | 62.84 | | 5.83 | | |
| | | 1290 | 206.11 | 62.84 | 62.84 | | 5.83 | | |
| | | 1320 | 206.11 | 62.84 | 62.84 | | 5.83 | | |
| | | 1350 | 206.11 | 62.84 | 62.84 | | 5.83 | | |
| | | 1380 | 206.11 | 62.84 | 62.84 | | 5.83 | | |
| | | 1410 | 206.11 | 62.84 | 62.84 | | 5.83 | | |
| | | 1440 | 206.11 | 62.84 | 62.84 | | 5.83 | | |

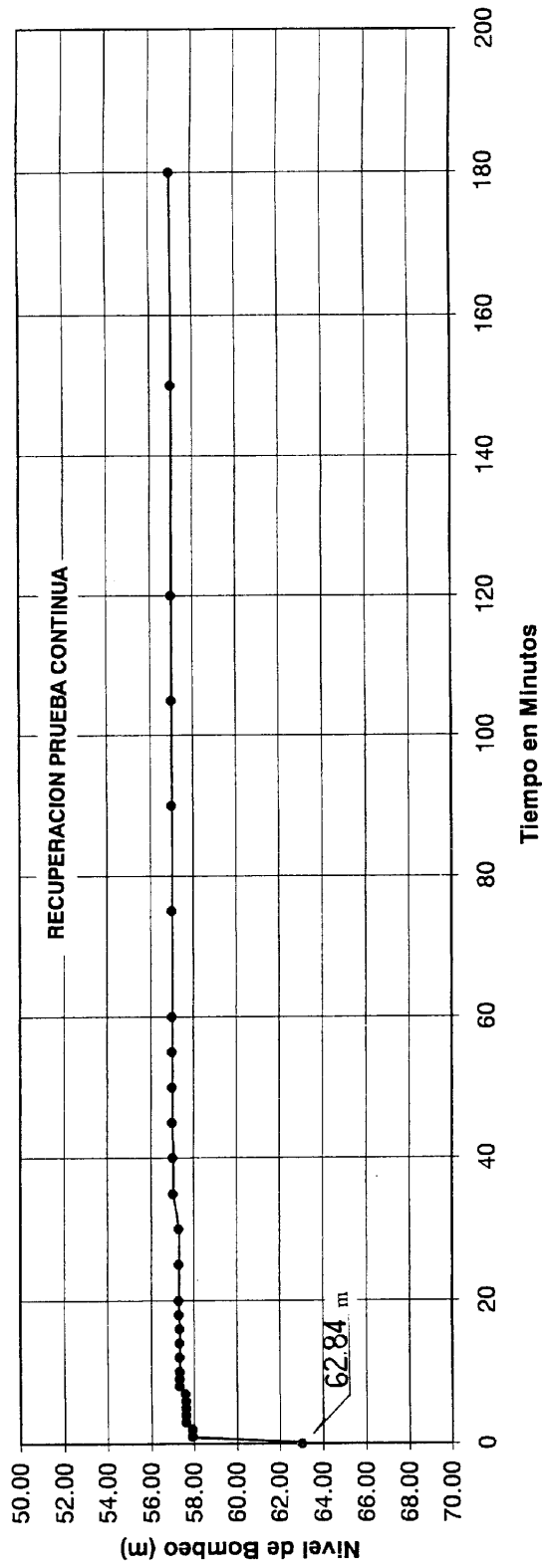
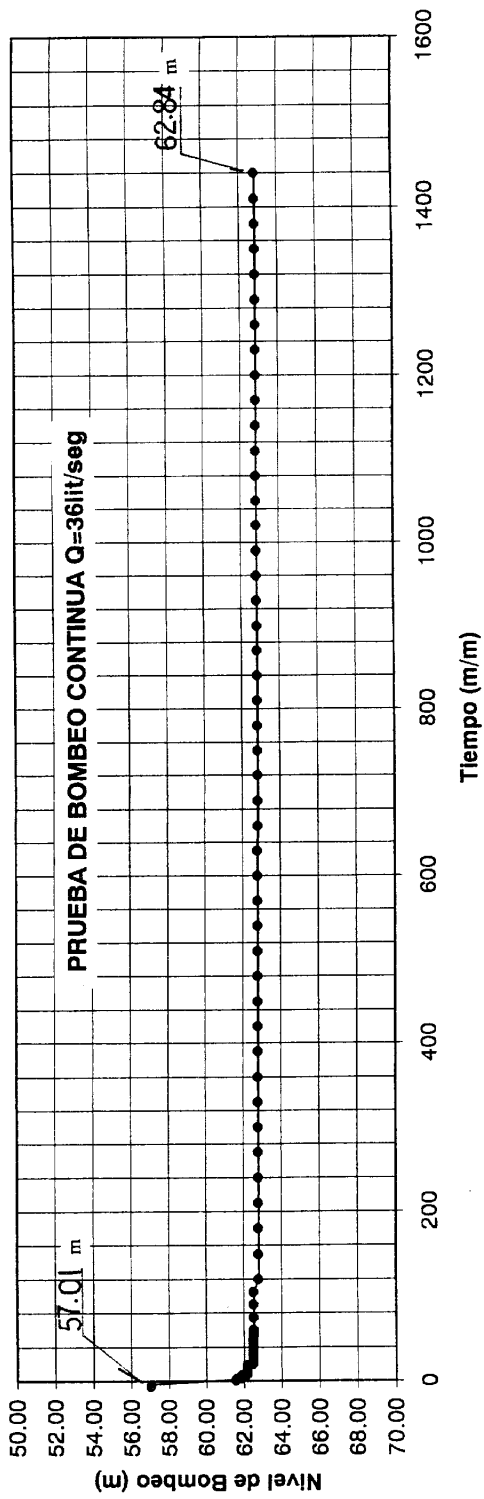
ORIFICIO: MEDIDOR
 NIVEL DE BOMBEO: _____
 NIVEL ESTÁTICO: 57.01
 EQUIPO: _____

RECUPERACION DE PRUEBA CONTINUA

Empresa Municipal De Agua Quetzaltenango
 Propietario
Choquialto Zona 6 Quetzaltenango
 Dirección

LINEA DE AIRE A : Piesometro PIES
 BOMBA INSTALADA 408 PIES
 PRODUCCION: L.P.M.
 BOMBA USADA DE: ETAPA 60 HP.
 OPERADOR: MANUEL AGUIRÍ

| FECHA: | TIEMPO | | NIVEL EN | | NIVELES | | Abatimiento | PRODUCCION | OBSERVACIONES |
|--------|--------|---------|----------|--------|----------|----------|-------------|--------------------|---------------|
| | Hora | Minutos | Pies | Metros | Dinámico | Estático | | Litros Por segundo | |
| | | 1 | 189.00 | 57.62 | 57.62 | | 0.61 | 36 | OPERACION |
| | | 2 | 188.10 | 57.35 | 57.35 | | 0.34 | | |
| | | 3 | 188.10 | 57.35 | 57.35 | | 0.34 | | |
| | | 4 | 188.09 | 57.34 | 57.34 | | 0.33 | | |
| | | 5 | 188.08 | 57.34 | 57.34 | | 0.33 | | |
| | | 6 | 188.07 | 57.34 | 57.34 | | 0.33 | | |
| | | 7 | 188.07 | 57.34 | 57.34 | | 0.33 | | |
| | | 8 | 188.07 | 57.34 | 57.34 | | 0.33 | | |
| | | 9 | 188.06 | 57.34 | 57.34 | | 0.33 | | |
| | | 10 | 188.05 | 57.33 | 57.33 | | 0.32 | | |
| | | 12 | 188.05 | 57.33 | 57.33 | | 0.32 | | |
| | | 14 | 188.04 | 57.33 | 57.33 | | 0.32 | | |
| | | 16 | 188.04 | 57.33 | 57.33 | | 0.32 | | |
| | | 18 | 188.03 | 57.33 | 57.33 | | 0.32 | | |
| | | 20 | 188.03 | 57.33 | 57.33 | | 0.32 | | |
| | | 25 | 188.02 | 57.32 | 57.32 | | 0.31 | | |
| | | 30 | 188.01 | 57.32 | 57.32 | | 0.31 | | |
| | | 35 | 188.00 | 57.32 | 57.32 | | 0.31 | | |
| | | 40 | 187.10 | 57.04 | 57.04 | | 0.03 | | |
| | | 45 | 187.10 | 57.04 | 57.04 | | 0.03 | | |
| | | 50 | 187.09 | 57.04 | 57.04 | | 0.03 | | |
| | | 55 | 187.09 | 57.04 | 57.04 | | 0.03 | | |
| | | 60 | 187.08 | 57.04 | 57.04 | | 0.03 | | |
| | | 75 | 187.07 | 57.03 | 57.03 | | 0.02 | | |
| | | 90 | 187.06 | 57.03 | 57.03 | | 0.02 | | |
| | | 105 | 187.06 | 57.03 | 57.03 | | 0.02 | | |
| | | 120 | 187.05 | 57.03 | 57.03 | | 0.02 | | |
| | | 150 | 187.05 | 57.03 | 57.03 | | 0.02 | | |
| | | 180 | 187.04 | 57.02 | 57.02 | | 0.01 | | |
| | | | | | | | | | |
| | | | | | | | | | |



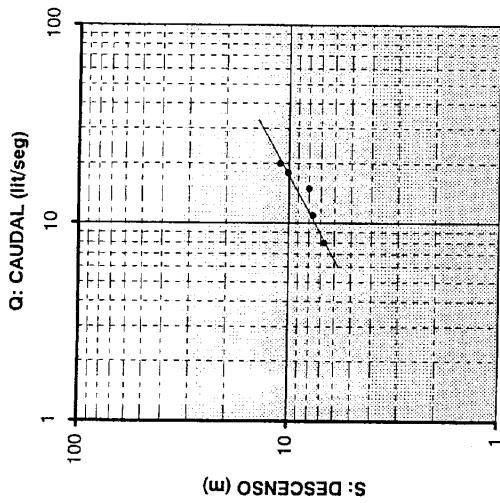
Pozo Chirriez 4

| | | | |
|---|--|------------------------------|------------------------|
| ORIFICIO: <u>MEDIDOR</u> | PRUEBA DE BOMBEO GRADUAL | LINEA DE AIRE A : Piesometro | PIES |
| NIVEL DE BOMBEO: <u> </u> | Empresa Municipal De Agua Quetzaltenango | BOMBA INSTALADA | 50 Mts. |
| NIVEL ESTATICO: <u>4.59</u> | Propietario | PRODUCCION: | G.P.M. |
| EQUIPO: <u> </u> | Pozo Chirriez # 4 Zona 2 Quetzaltenango | BOMBA USADA DE: ETAPAS: | HP. |
| | Dirección | OPERADOR: | <u>VICENTE AGUIRRE</u> |

| FECHA: | TIEMPO | | NIVEL EN | | NIVELES | | Abatimiento | PRODUCCION | O B S E R V A C I O N E S |
|-----------|--------|---------|----------|--------|----------|----------|-------------|--------------------|---------------------------|
| | Hora | Minutos | Pies | Metros | Dinámico | Estático | | Litros Por segundo | |
| 2004/2/20 | 16.10 | 0 | 15.08 | 4.59 | 0.00 | 4.59 | 0 | | |
| | | 1 | 22.11 | 6.74 | 6.74 | | 2.15 | 8 | PRIMER ESCALON 8 LPS. |
| | | 2 | 22.10 | 6.74 | 6.74 | | 2.15 | 8 | |
| | | 3 | 22.08 | 6.73 | 6.73 | | 2.14 | 8 | |
| | | 4 | 22.08 | 6.73 | 6.73 | | 2.14 | 8 | |
| | | 5 | 22.08 | 6.73 | 6.73 | | 2.14 | 8 | |
| | | 6 | 22.08 | 6.73 | 6.73 | | 2.14 | 8 | |
| | | 7 | 22.08 | 6.73 | 6.73 | | 2.14 | 8 | |
| | | 8 | 22.08 | 6.73 | 6.73 | | 2.14 | 8 | |
| | | 9 | 22.05 | 6.72 | 6.72 | | 2.13 | 8 | |
| | | 10 | 22.05 | 6.72 | 6.72 | | 2.13 | 8 | |
| | | 12 | 22.05 | 6.72 | 6.72 | | 2.13 | 8 | |
| | | 14 | 22.05 | 6.72 | 6.72 | | 2.13 | 8 | |
| | | 16 | 22.05 | 6.72 | 6.72 | | 2.13 | 8 | |
| | | 18 | 22.05 | 6.72 | 6.72 | | 2.13 | 8 | |
| | | 20 | 22.05 | 6.72 | 6.72 | | 2.13 | 8 | |
| | | 25 | 22.05 | 6.72 | 6.72 | | 2.13 | 8 | |
| | | 30 | 22.05 | 6.72 | 6.72 | | 2.13 | 8 | |
| | | 35 | 22.05 | 6.72 | 6.72 | | 2.13 | 8 | |
| | | 40 | 22.05 | 6.72 | 6.72 | | 2.13 | 8 | |
| | | 45 | 22.05 | 6.72 | 6.72 | | 2.13 | 8 | |
| | | 50 | 22.05 | 6.72 | 6.72 | | 2.13 | 8 | |
| | | 55 | 22.05 | 6.72 | 6.72 | | 2.13 | 8 | |
| | | 60 | 22.02 | 6.71 | 6.71 | | 2.12 | 8 | |
| | | 75 | 22.02 | 6.71 | 6.71 | | 2.12 | 8 | |
| | | 90 | 22.01 | 6.71 | 6.71 | | 2.12 | 8 | |
| | | 105 | 22.01 | 6.71 | 6.71 | | 2.12 | 8 | |
| | | 120 | 22.01 | 6.71 | 6.71 | | 2.12 | 8 | |
| 2004/2/20 | | 1 | 24.11 | 7.35 | 7.35 | | 2.76 | 11 | SEGUNDO ESCALON |
| | | 2 | 25.00 | 7.62 | 7.62 | | 3.03 | 11 | CON 11 LPS. |
| | | 3 | 25.00 | 7.62 | 7.62 | | 3.03 | 11 | |
| | | 4 | 25.00 | 7.62 | 7.62 | | 3.03 | 11 | |
| | | 5 | 25.01 | 7.63 | 7.63 | | 3.04 | 11 | |
| | | 6 | 25.01 | 7.63 | 7.63 | | 3.04 | 11 | |
| | | 7 | 25.01 | 7.63 | 7.63 | | 3.04 | 11 | |
| | | 8 | 25.01 | 7.63 | 7.63 | | 3.04 | 11 | |
| | | 9 | 25.01 | 7.63 | 7.63 | | 3.04 | 11 | |
| | | 10 | 25.01 | 7.63 | 7.63 | | 3.04 | 11 | |
| | | 12 | 25.01 | 7.63 | 7.63 | | 3.04 | 11 | |
| | | 14 | 25.01 | 7.63 | 7.63 | | 3.04 | 11 | |
| | | 16 | 25.01 | 7.63 | 7.63 | | 3.04 | 11 | |
| | | 18 | 25.01 | 7.63 | 7.63 | | 3.04 | 11 | |
| | | 20 | 25.01 | 7.63 | 7.63 | | 3.04 | 11 | |
| | | 25 | 25.01 | 7.63 | 7.63 | | 3.04 | 11 | |
| | | 30 | 25.01 | 7.63 | 7.63 | | 3.04 | 11 | |
| | | 35 | 25.01 | 7.63 | 7.63 | | 3.04 | 11 | |
| | | 40 | 25.01 | 7.63 | 7.63 | | 3.04 | 11 | |
| | | 45 | 25.01 | 7.63 | 7.63 | | 3.04 | 11 | |
| | | 50 | 25.01 | 7.63 | 7.63 | | 3.04 | 11 | |
| | | 55 | 25.01 | 7.63 | 7.63 | | 3.04 | 11 | |
| | | 60 | 25.01 | 7.63 | 7.63 | | 3.04 | 11 | |
| | | 75 | 25.01 | 7.63 | 7.63 | | 3.04 | 11 | |
| | | 90 | 25.01 | 7.63 | 7.63 | | 3.04 | 11 | |
| | | 105 | 25.01 | 7.63 | 7.63 | | 3.04 | 11 | |
| | | 120 | 25.01 | 7.63 | 7.63 | | 3.04 | 11 | |
| 2004/2/20 | | 1 | 26.04 | 7.94 | 7.94 | | 3.35 | 15 | TERCER ESCALON 15 LTS. |
| | | 2 | 26.04 | 7.94 | 7.94 | | 3.35 | 15 | |
| | | 3 | 26.04 | 7.94 | 7.94 | | 3.35 | 15 | |
| | | 4 | 26.04 | 7.94 | 7.94 | | 3.35 | 15 | |
| | | 5 | 26.04 | 7.94 | 7.94 | | 3.35 | 15 | |
| | | 6 | 26.04 | 7.94 | 7.94 | | 3.35 | 15 | |
| | | 7 | 26.04 | 7.94 | 7.94 | | 3.35 | 15 | |
| | | 8 | 26.04 | 7.94 | 7.94 | | 3.35 | 15 | |
| | | 9 | 26.05 | 7.94 | 7.94 | | 3.35 | 15 | |
| | | 10 | 26.06 | 7.95 | 7.95 | | 3.36 | 15 | |
| | | 12 | 26.07 | 7.95 | 7.95 | | 3.36 | 15 | |
| | | 14 | 26.08 | 7.95 | 7.95 | | 3.36 | 15 | |
| | | 16 | 26.08 | 7.95 | 7.95 | | 3.36 | 15 | |
| | | 18 | 26.08 | 7.95 | 7.95 | | 3.36 | 15 | |
| | | 20 | 26.08 | 7.95 | 7.95 | | 3.36 | 15 | |
| | | 25 | 26.08 | 7.95 | 7.95 | | 3.36 | 15 | |
| | | 30 | 26.08 | 7.95 | 7.95 | | 3.36 | 15 | |
| | | 35 | 26.08 | 7.95 | 7.95 | | 3.36 | 15 | |
| | | 40 | 26.08 | 7.95 | 7.95 | | 3.36 | 15 | |

| | | | | | | | | | |
|-----------|------|-----|-------|-------|-------|--|------|----|------------------------|
| | | 45 | 26.08 | 7.95 | 7.95 | | 3.36 | 15 | |
| | | 50 | 26.08 | 7.95 | 7.95 | | 3.36 | 15 | |
| | | 55 | 26.08 | 7.95 | 7.95 | | 3.36 | 15 | |
| | | 60 | 26.08 | 7.95 | 7.95 | | 3.36 | 15 | |
| | | 75 | 26.08 | 7.95 | 7.95 | | 3.36 | 15 | |
| | | 90 | 26.08 | 7.95 | 7.95 | | 3.36 | 15 | |
| | | 105 | 26.08 | 7.95 | 7.95 | | 3.36 | 15 | |
| | | 120 | 26.08 | 7.95 | 7.95 | | 3.36 | 15 | |
| 2004/2/20 | | 1 | 32.10 | 9.79 | 9.79 | | 5.20 | 18 | CUARTO ESCALON |
| | | 2 | 33.00 | 10.06 | 10.06 | | 5.47 | 18 | CON 18 LPS. |
| | | 3 | 33.00 | 10.06 | 10.06 | | 5.47 | 18 | |
| | | 4 | 33.00 | 10.06 | 10.06 | | 5.47 | 18 | |
| | | 5 | 33.00 | 10.06 | 10.06 | | 5.47 | 18 | |
| | | 6 | 33.00 | 10.06 | 10.06 | | 5.47 | 18 | |
| | | 7 | 33.00 | 10.06 | 10.06 | | 5.47 | 18 | |
| | | 8 | 33.00 | 10.06 | 10.06 | | 5.47 | 18 | |
| | | 9 | 33.00 | 10.06 | 10.06 | | 5.47 | 18 | |
| | | 10 | 33.00 | 10.06 | 10.06 | | 5.47 | 18 | |
| | | 12 | 33.00 | 10.06 | 10.06 | | 5.47 | 18 | |
| | | 14 | 33.00 | 10.06 | 10.06 | | 5.47 | 18 | |
| | | 16 | 33.00 | 10.06 | 10.06 | | 5.47 | 18 | |
| | | 18 | 33.00 | 10.06 | 10.06 | | 5.47 | 18 | |
| | | 20 | 33.00 | 10.06 | 10.06 | | 5.47 | 18 | |
| | | 25 | 33.00 | 10.06 | 10.06 | | 5.47 | 18 | |
| | | 30 | 33.00 | 10.06 | 10.06 | | 5.47 | 18 | |
| | | 35 | 33.00 | 10.06 | 10.06 | | 5.47 | 18 | |
| | | 40 | 33.00 | 10.06 | 10.06 | | 5.47 | 18 | |
| | | 45 | 33.00 | 10.06 | 10.06 | | 5.47 | 18 | |
| | | 50 | 33.00 | 10.06 | 10.06 | | 5.47 | 18 | |
| | | 55 | 33.00 | 10.06 | 10.06 | | 5.47 | 18 | |
| | | 60 | 33.00 | 10.06 | 10.06 | | 5.47 | 18 | |
| | | 75 | 33.00 | 10.06 | 10.06 | | 5.47 | 18 | |
| | | 90 | 33.00 | 10.06 | 10.06 | | 5.47 | 18 | |
| | | 105 | 33.00 | 10.06 | 10.06 | | 5.47 | 18 | |
| | | 120 | 33.00 | 10.06 | 10.06 | | 5.47 | 18 | |
| 2004/2/21 | | 1 | 36.02 | 10.98 | 10.98 | | 6.39 | 20 | QUINTO ESCALON 20 LPS. |
| | | 2 | 36.04 | 10.99 | 10.99 | | 6.40 | 20 | |
| | | 3 | 36.04 | 10.99 | 10.99 | | 6.40 | 20 | |
| | | 4 | 36.05 | 10.99 | 10.99 | | 6.40 | 20 | |
| | | 5 | 36.06 | 10.99 | 10.99 | | 6.40 | 20 | |
| | | 6 | 36.06 | 10.99 | 10.99 | | 6.40 | 20 | |
| | | 7 | 36.06 | 10.99 | 10.99 | | 6.40 | 20 | |
| | | 8 | 36.06 | 10.99 | 10.99 | | 6.40 | 20 | |
| | | 9 | 36.06 | 10.99 | 10.99 | | 6.40 | 20 | |
| | | 10 | 36.06 | 10.99 | 10.99 | | 6.40 | 20 | |
| | | 12 | 36.06 | 10.99 | 10.99 | | 6.40 | 20 | |
| | | 14 | 36.06 | 10.99 | 10.99 | | 6.40 | 20 | |
| | | 16 | 36.06 | 10.99 | 10.99 | | 6.40 | 20 | |
| | | 18 | 36.06 | 10.99 | 10.99 | | 6.40 | 20 | |
| | | 20 | 36.06 | 10.99 | 10.99 | | 6.40 | 20 | |
| | | 25 | 36.06 | 10.99 | 10.99 | | 6.40 | 20 | |
| | | 30 | 36.06 | 10.99 | 10.99 | | 6.40 | 20 | |
| | | 35 | 36.06 | 10.99 | 10.99 | | 6.40 | 20 | |
| | | 40 | 36.06 | 10.99 | 10.99 | | 6.40 | 20 | |
| | | 45 | 36.06 | 10.99 | 10.99 | | 6.40 | 20 | |
| | | 50 | 36.06 | 10.99 | 10.99 | | 6.40 | 20 | |
| | | 55 | 36.06 | 10.99 | 10.99 | | 6.40 | 20 | |
| | | 60 | 36.06 | 10.99 | 10.99 | | 6.40 | 20 | |
| | | 75 | 36.06 | 10.99 | 10.99 | | 6.40 | 20 | |
| | | 90 | 36.06 | 10.99 | 10.99 | | 6.40 | 20 | |
| | | 105 | 36.06 | 10.99 | 10.99 | | 6.40 | 20 | |
| | | 120 | 36.06 | 10.99 | 10.99 | | 6.40 | 20 | |
| 2004/2/21 | 2:10 | 1 | 16.01 | 4.88 | 4.88 | | 0.29 | | RECUPERACION |
| | | 2 | 15.10 | 4.60 | 4.60 | | 0.01 | | |
| | | 3 | 15.08 | 4.60 | 4.60 | | 0.01 | | |
| | | 4 | 15.06 | 4.59 | 4.59 | | 0.00 | | |
| | | 5 | 15.05 | 4.59 | 4.59 | | 0.00 | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |

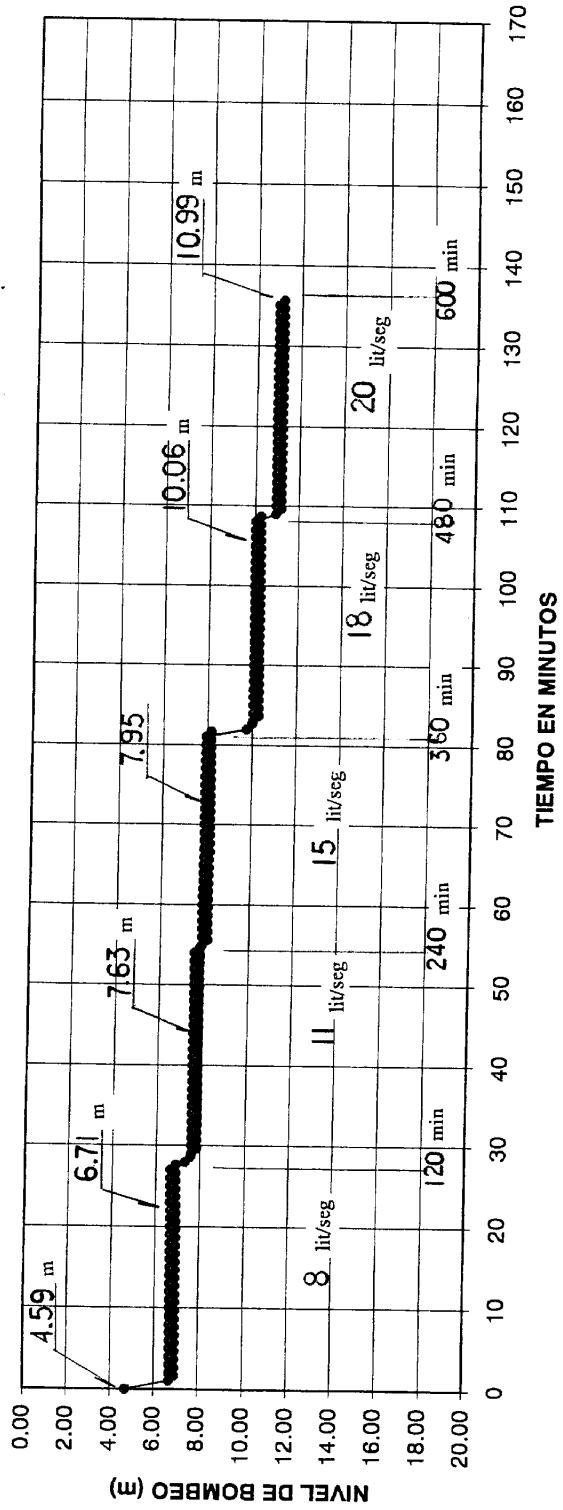
PRUEBA DE BOMBEO GRADUAL S-Q



| Escalon | Caudal Q (lit/seg) | Desenso s (m) |
|---------|--------------------|---------------|
| 1 | 8 | 6.71 |
| 2 | 11 | 7.63 |
| 3 | 15 | 7.95 |
| 4 | 18 | 10.06 |
| 5 | 20 | 10.99 |

CAUDAL ESTIMADO PARA LA PRUEBA DE BOMBEO CONTINUA DE 20 LITROS POR SEGUNDO.

PRUEBA DE BOMBEO GRADUAL POZO CHIRRIEZ #4 ZONA 2

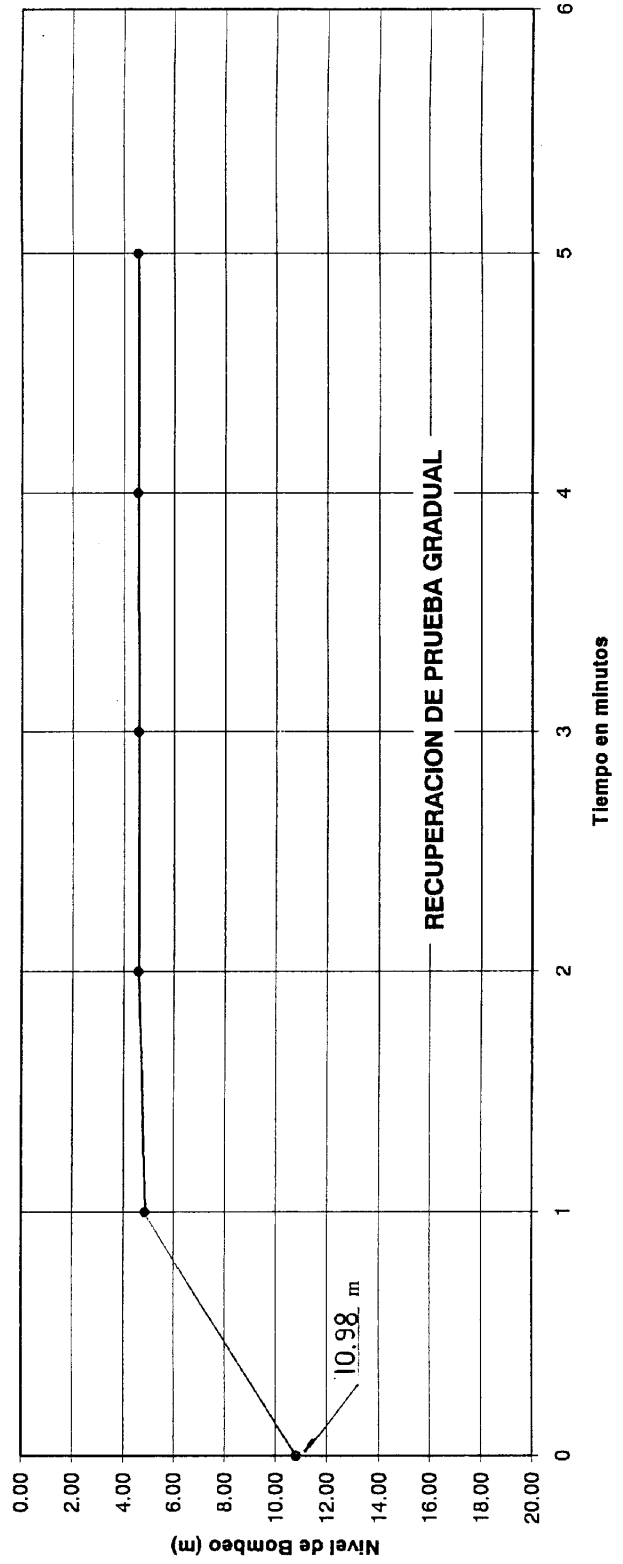
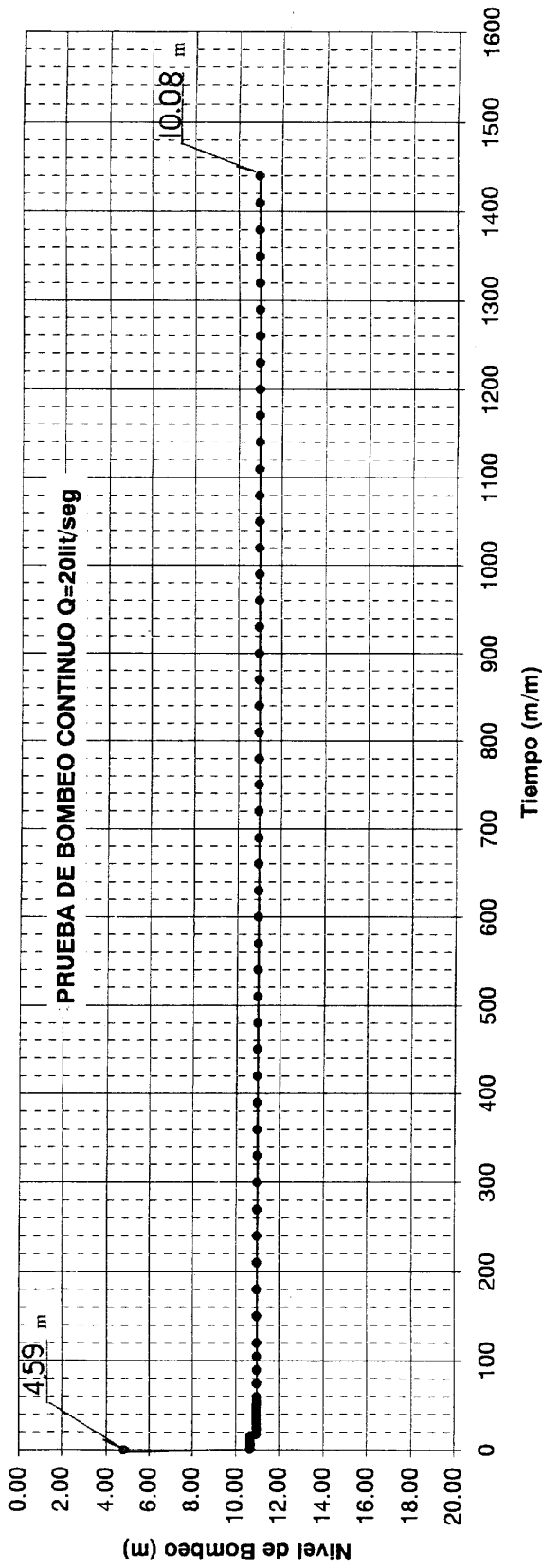


| | | | | | | |
|------------------|--|---|--|-------------------|----------------|--------|
| ORIFICIO: | PRUEBA DE BOMBEO CONTINUA | | | LINEA DE AIRE A : | Piesometro | PIES |
| NIVEL DE BOMBEO: | Empresa Municipal De Agua Quetzaltenango | | | BOMBA INSTALADA | 50 | PIES |
| NIVEL ESTATICO: | 4.59 | Propietario | | PRODUCCION: | 20 | L.P.M. |
| EQUIPO: | L-9 | Pozo Chirriez # 4 Zona 2 Quetzaltenango | | BOMBA USADA DE: | ETAPAS: | HP. |
| | | Dirección | | OPERADOR: | MANUEL AGUIRRE | |

| FECHA: | TIEMPO | | PIES | NIVEL EN Metros | NIVELES | | Abatimiento | PRODUCCION Litros Por segundo | OBSERVACIONES |
|-----------|--------|---------|-------|--------------------|----------|----------|-------------|----------------------------------|---------------|
| | Hora | Minutos | | | Dinámico | Estático | | | |
| 2004/2/21 | 8.00 | 0 | 15.05 | 4.59 | 0.00 | 4.59 | 0 | 20 LTS. | |
| | | 1 | 35.05 | 10.69 | 10.69 | | 6.10 | | |
| | | 2 | 35.07 | 10.69 | 10.69 | | 6.10 | | |
| | | 3 | 35.09 | 10.70 | 10.70 | | 6.11 | | |
| | | 4 | 35.10 | 10.70 | 10.70 | | 6.11 | | |
| | | 5 | 35.10 | 10.70 | 10.70 | | 6.11 | | |
| | | 6 | 35.11 | 10.70 | 10.70 | | 6.11 | | |
| | | 7 | 35.11 | 10.70 | 10.70 | | 6.11 | | |
| | | 8 | 35.11 | 10.70 | 10.70 | | 6.11 | | |
| | | 9 | 35.11 | 10.70 | 10.70 | | 6.11 | | |
| | | 10 | 35.11 | 10.70 | 10.70 | | 6.11 | | |
| | | 12 | 35.11 | 10.70 | 10.70 | | 6.11 | | |
| | | 14 | 35.11 | 10.70 | 10.70 | | 6.11 | | |
| | | 16 | 35.11 | 10.70 | 10.70 | | 6.11 | | |
| | | 18 | 36.00 | 10.98 | 10.98 | | 6.39 | | |
| | | 20 | 36.00 | 10.98 | 10.98 | | 6.39 | | |
| | | 25 | 36.00 | 10.98 | 10.98 | | 6.39 | | |
| | | 30 | 36.00 | 10.98 | 10.98 | | 6.39 | | |
| | | 35 | 36.00 | 10.98 | 10.98 | | 6.39 | | |
| | | 40 | 36.00 | 10.98 | 10.98 | | 6.39 | | |
| | | 45 | 36.00 | 10.98 | 10.98 | | 6.39 | | |
| | | 50 | 36.00 | 10.98 | 10.98 | | 6.39 | | |
| | | 55 | 36.00 | 10.98 | 10.98 | | 6.39 | | |
| | | 60 | 36.00 | 10.98 | 10.98 | | 6.39 | | |
| | | 75 | 36.00 | 10.98 | 10.98 | | 6.39 | | |
| | | 90 | 36.00 | 10.98 | 10.98 | | 6.39 | | |
| | | 105 | 36.00 | 10.98 | 10.98 | | 6.39 | | |
| 2004/2/21 | | 120 | 36.00 | 10.98 | 10.98 | | 6.39 | | |
| | | 150 | 36.00 | 10.98 | 10.98 | | 6.39 | | |
| | | 180 | 36.00 | 10.98 | 10.98 | | 6.39 | | |
| | | 210 | 36.00 | 10.98 | 10.98 | | 6.39 | | |
| | | 240 | 36.00 | 10.98 | 10.98 | | 6.39 | | |
| | | 270 | 36.00 | 10.98 | 10.98 | | 6.39 | | |
| | | 300 | 36.00 | 10.98 | 10.98 | | 6.39 | | |
| | | 330 | 36.00 | 10.98 | 10.98 | | 6.39 | | |
| | | 360 | 36.00 | 10.98 | 10.98 | | 6.39 | | |
| | | 390 | 36.00 | 10.98 | 10.98 | | 6.39 | | |
| | | 420 | 36.00 | 10.98 | 10.98 | | 6.39 | | |
| | | 450 | 36.00 | 10.98 | 10.98 | | 6.39 | | |
| | | 480 | 36.00 | 10.98 | 10.98 | | 6.39 | | |
| | | 510 | 36.00 | 10.98 | 10.98 | | 6.39 | | |
| | | 540 | 36.00 | 10.98 | 10.98 | | 6.39 | | |
| | | 570 | 36.00 | 10.98 | 10.98 | | 6.39 | | |
| | | 600 | 36.00 | 10.98 | 10.98 | | 6.39 | | |
| | | 630 | 36.00 | 10.98 | 10.98 | | 6.39 | | |
| | | 660 | 36.00 | 10.98 | 10.98 | | 6.39 | | |
| | | 690 | 36.00 | 10.98 | 10.98 | | 6.39 | | |
| | | 720 | 36.00 | 10.98 | 10.98 | | 6.39 | | |
| | | 750 | 36.00 | 10.98 | 10.98 | | 6.39 | | |
| | | 780 | 36.00 | 10.98 | 10.98 | | 6.39 | | |
| | | 810 | 36.00 | 10.98 | 10.98 | | 6.39 | | |
| | | 840 | 36.00 | 10.98 | 10.98 | | 6.39 | | |
| | | 870 | 36.00 | 10.98 | 10.98 | | 6.39 | | |
| | | 900 | 36.00 | 10.98 | 10.98 | | 6.39 | | |
| | | 930 | 36.00 | 10.98 | 10.98 | | 6.39 | | |
| | | 960 | 36.00 | 10.98 | 10.98 | | 6.39 | | |
| | | 990 | 36.00 | 10.98 | 10.98 | | 6.39 | | |
| | | 1020 | 36.00 | 10.98 | 10.98 | | 6.39 | | |
| | | 1050 | 36.00 | 10.98 | 10.98 | | 6.39 | | |
| | | 1080 | 36.00 | 10.98 | 10.98 | | 6.39 | | |
| | | 1110 | 36.00 | 10.98 | 10.98 | | 6.39 | | |
| | | 1140 | 36.00 | 10.98 | 10.98 | | 6.39 | | |
| | | 1170 | 36.00 | 10.98 | 10.98 | | 6.39 | | |
| | | 1200 | 36.00 | 10.98 | 10.98 | | 6.39 | | |
| | | 1230 | 36.00 | 10.98 | 10.98 | | 6.39 | | |
| | | 1260 | 36.00 | 10.98 | 10.98 | | 6.39 | | |
| 2004/2/22 | | 1290 | 36.00 | 10.98 | 10.98 | | 6.39 | | |
| | | 1320 | 36.00 | 10.98 | 10.98 | | 6.39 | | |
| | | 1350 | 36.00 | 10.98 | 10.98 | | 6.39 | | |
| | | 1380 | 36.00 | 10.98 | 10.98 | | 6.39 | | |
| | | 1410 | 36.00 | 10.98 | 10.98 | | 6.39 | | |
| | | 1440 | 36.00 | 10.98 | 10.98 | | 6.39 | | |

| | | | |
|------------------------|--|---------------------------------|-----------|
| ORIFICIO: _____ | PRUEBA DE BOMBEO CONTINUA | LINEA DE AIRE A : Piesometro | PIES |
| NIVEL DE BOMBEO: _____ | Empresa Municipal De Agua Quetzaltenango | BOMBA INSTALADA | 50 PIES |
| NIVEL ESTATICO: _____ | 4.59 Propietario | PRODUCCION: | 20 L.P.M. |
| EQUIPO: _____ | Pozo Chirriez # 4 Zona 2 Quetzaltenago | BOMBA USADA DE: ETAPAS: | HP. |
| | Dirección | OPERADOR: <u>MANUEL AGUIRRE</u> | |

| FECHA: | TIEMPO | | NIVEL EN Pies | NIVELES | | | Abatimiento | PRODUCCION | OBSERVACIONES |
|--------|--------|---------|---------------|---------|----------|----------|-------------|--------------------|----------------------|
| | Hora | Minutos | | Metros | Dinámico | Estático | | Litros Por segundo | |
| | | 1 | 16.00 | 4.88 | 4.88 | | 0.29 | | RECUPERACION |
| | | 2 | 15.11 | 4.61 | 4.61 | | 0.02 | | |
| | | 3 | 15.09 | 4.60 | 4.60 | | 0.01 | | |
| | | 4 | 15.07 | 4.59 | 4.59 | | 0.00 | | |
| | | 5 | 15.05 | 4.59 | 4.59 | | 0.00 | | |
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LABORATORIO QUIMICO
Microbiologico



| Característica | UNIDAD | COGUANOR | | NACIMIENTOS | | |
|--------------------|-----------|---------------------------------------|---------------------------------------|-----------------------------------|---------------------------------|---|
| | | LMA NO RECHAZABLE NO RECHAZABLE | LMP NO RECHAZABLE NO RECHAZABLE | CUC MOLINO QUETZAL INCOLORO | CUC 3 SANTA RITA INCOLORO | ENTRADA AL TUNEL ACCEPTABLE ACCEPTABLE INCOLORO |
| OLOR | | | | | | |
| SABOR | | | | | | |
| COLOR | | | | | | |
| PH | | 7.0-7.5 | 6.5-8.5 | 7.00 | 7.0 | 7.00 |
| TEMPERATURA | °C | 18.0 -30.0 | <34.0 | 19 | 19.71 | 19 |
| TURBIDEZ /UNT | UNT | 5.0 | 15.0 | 0.141 | 0.157 | 0.151 |
| CONDUCTIVIDAD | µ S/cm | 100-750 | <1,500 | 181.6 | 147.6 | 182.1 |
| SOLIDOS DISUELTOS | mg/L | 500.0 | 1000.0 | 90.8 | 73.8 | 91.05 |
| NITRATOS | mg/L | - | 10 | No Se Detectid | No Se Detectid | No Se Detectid |
| NITRITOS | mg/L | - | 1 | 0.00 | 0.00 | 0.00 |
| OXIGENO DISUELTO | mg/L | - | - | 1.16 | 0.8 | 0.16 |
| CLORUROS | mg/L | 100.000 | 250.000 | No Se Detectid | No Se Detectid | No Se Detectid |
| DUREZA TOTAL | mg/L | 100.000 | 500.000 | 61 | 47 | 60 |
| MAGNESIO | mg/L | 50.000 | 100.000 | 6.24 | 5.28 | 6.24 |
| CALCIO | mg/L | 75.000 | 150.000 | 14 | 10 | 13.6 |
| HIERRO TOTAL | mg/L | 0.100 | 1.000 | 0.01 | 0.00 | 0.06 |
| MANGANESO | mg/L | 0.050 | 0.500 | 0.00 | 0.00 | 0.00 |
| SULFATOS | mg/L | 100.000 | 250.000 | 0.00 | 0.00 | 0.00 |
| COBRE | mg/L | 0.050 | 1.500 | 0.00 | 0.00 | 0.00 |
| FLUORURO | mg/L | - | 1.700 | 0.03 | 0.00 | 0.00 |
| CROMO | mg/L | - | 0.050 | 0.00 | 0.00 | 0.00 |
| CIANURO | mg/L | - | 0.070 | 0.00 | 0.00 | 0.00 |
| CADMIO | mg/L | - | 0.003 | 0.00 | 0.00 | 0.00 |
| ARSENICO | mg/L | - | 0.010 | 0.00 | 0.00 | 0.00 |
| PLOMO | mg/L | - | 0.010 | 0.00 | 0.00 | 0.00 |
| Coliformes totales | JFC/100ml | 1 | 1 | 7 | 14 | 8 |
| Coliformes fecales | JFC/100ml | 0 | 0 | 3 | 7 | 3 |



LABORATORIO QUIMICO

Microbiológico



FECHA RECIBIDA: 27/10/2.003

| Característica | UNIDAD | POSOZ | | | | | | | | | | | | | |
|--------------------|-----------|---------------|-------------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|
| | | CHITUX | SALIDA SAN MARCOS | FLORESTA | ZONA 8 | SAN ISIDRO | DEMOCRA CIA | ZOOLOGICO | PARAIZO | PACAJA | AMERICAS | BENITO JUAREZ | | | |
| OLOR | | ACEPTABLE | ACEPTABLE | ACEPTABLE | ACEPTABLE | ACEPTABLE | ACEPTABLE | ACEPTABLE | ACEPTABLE | ACEPTABLE | ACEPTABLE | ACEPTABLE | ACEPTABLE | ACEPTABLE | ACEPTABLE |
| SABOR | | ACEPTABLE | ACEPTABLE | ACEPTABLE | ACEPTABLE | ACEPTABLE | ACEPTABLE | ACEPTABLE | ACEPTABLE | ACEPTABLE | ACEPTABLE | ACEPTABLE | ACEPTABLE | ACEPTABLE | ACEPTABLE |
| COLOR | | INCOLORO | INCOLORO | INCOLORO | INCOLORO | INCOLORO | INCOLORO | INCOLORO | INCOLORO | INCOLORO | INCOLORO | INCOLORO | INCOLORO | INCOLORO | INCOLORO |
| PH | | 7.4 | 7.2 | 7.4 | 7.3 | 7.35 | 7.5 | 7.2 | 7.3 | 7.4 | 7.5 | 7.5 | 7.5 | 7.5 | 7.5 |
| TEMPERATURA | °C | 19 | 19 | 19 | 19 | 19.2 | 19 | 19 | 18 | 19 | 18 | 18 | 18 | 18 | 18 |
| TURBIDEZ /UNT | UNT | 0.195 | 0.146 | 0.156 | 0.173 | 0.179 | 0.238 | 0.162 | 0.174 | 0.153 | 0.230 | 0.111 | 0.111 | 0.111 | 0.111 |
| CONDUCTIVIDAD | µ S/cm | 155.9 | 182.6 | 177.9 | 167.6 | 168 | 157.4 | 176.6 | 253 | 320.0 | 395.0 | 264 | 264 | 264 | 264 |
| SOLIDOS DISUELTOS | mg/L | 77.95 | 91.3 | 88.95 | 83.8 | 84 | 78.7 | 88.3 | 126.5 | 160.0 | 197.5 | 132 | 132 | 132 | 132 |
| NITRATOS | mg/L | No Se Detectd | No Se Detectd | No Se Detectd | No Se Detectd | No Se Detectd | No Se Detectd | No Se Detectd | No Se Detectd | No Se Detectd | No Se Detectd | No Se Detectd | No Se Detectd | No Se Detectd | No Se Detectd |
| NITRITOS | mg/L | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| OXIGENO DISUELTTO | mg/L | 0.7 | 0.12 | 0.7 | 0.7 | 0.12 | 0.15 | 0.11 | 0.1 | 0.8 | 0.9 | 0.11 | 0.11 | 0.11 | 0.11 |
| CLORUROS | mg/L | No Se Detectd | No Se Detectd | No Se Detectd | No Se Detectd | No Se Detectd | No Se Detectd | No Se Detectd | No Se Detectd | No Se Detectd | No Se Detectd | No Se Detectd | No Se Detectd | No Se Detectd | No Se Detectd |
| DUREZA TOTAL | mg/L | 50 | 52 | 52.5 | 51 | 47 | 50 | 51 | 91.0 | 108 | 151.0 | 75 | 75 | 75 | 75 |
| MAGNESIO | mg/L | 5.04 | 5.04 | 5.04 | 4.8 | 5.52 | 4.8 | 4.8 | 8.64 | 12 | 16.8 | 7.92 | 7.92 | 7.92 | 7.92 |
| CALCIO | mg/L | 11.6 | 12.4 | 12.6 | 12.4 | 9.6 | 12 | 12.4 | 22.0 | 23.2 | 32.4 | 18.8 | 18.8 | 18.8 | 18.8 |
| HIERRO TOTAL | mg/L | 0.44 | 0.04 | 0.01 | 0.04 | 0.07 | 0.00 | 0.02 | 0.07 | 0.07 | 0.00 | 0.02 | 0.02 | 0.02 | 0.02 |
| MANGANESO | mg/L | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| SULFATOS | mg/L | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 4.6 | 25.1 | 78.1 | 0.00 | 0.00 | 0.00 | 0.00 |
| COBRE | mg/L | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| FLUORURO | mg/L | 0.00 | 0.02 | 0.09 | 0.02 | 0.04 | 0.11 | 0.06 | 0.07 | 0.04 | 0.00 | 0.07 | 0.07 | 0.07 | 0.07 |
| CROMO | mg/L | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| CIANURO | mg/L | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| CADMIO | mg/L | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| ARSENICO | mg/L | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| PLOMO | mg/L | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Coliformes totales | UFC/100ml | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Coliformes fecales | UFC/100ml | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |



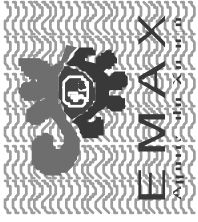
LABORATORIO QUIMICO

Microbiológico



FECHA RECIBIDA: 27/10/2003

| Característica | UNIDAD | POSOZ | | | | | | | | | | | | | | |
|--------------------|-----------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|
| | | CEFEMERQ | CHOQUI ALTO | CHIRRIEZ 1 | CHIRRIEZ 4 | CHIRRIEZ 5 | CHIRRIEZ 6 | CHIRRIEZ 7 | ROTONDA | CENIZAL | XEUL | ROSAS | | | | |
| OLOR | | ACEPTABLE | ACEPTABLE | ACEPTABLE | ACEPTABLE | ACEPTABLE | ACEPTABLE | ACEPTABLE | ACEPTABLE | ACEPTABLE | ACEPTABLE | ACEPTABLE | ACEPTABLE | ACEPTABLE | ACEPTABLE | ACEPTABLE |
| SABOR | | ACEPTABLE | ACEPTABLE | ACEPTABLE | ACEPTABLE | ACEPTABLE | ACEPTABLE | ACEPTABLE | ACEPTABLE | ACEPTABLE | ACEPTABLE | ACEPTABLE | ACEPTABLE | ACEPTABLE | ACEPTABLE | ACEPTABLE |
| COLOR | | INCOLORO | INCOLORO | INCOLORO | INCOLORO | INCOLORO | INCOLORO | INCOLORO | INCOLORO | INCOLORO | INCOLORO | INCOLORO | INCOLORO | INCOLORO | INCOLORO | INCOLORO |
| PH | | 7.4 | 7.6 | 7.5 | 7.6 | 7.4 | 7.5 | 7.4 | 7.5 | 7.6 | 7.5 | 7.6 | 7.2 | 7.6 | 7.4 | 7.4 |
| TEMPERATURA | °C | 19 | 19 | 18 | 18 | 18 | 18 | 18 | 18 | 18 | 18 | 18 | 18 | 18 | 18 | 18 |
| TURBIDEZ /UNT | UNT | 0.126 | 0.114 | 0.130 | 0.149 | 0.346 | 0.169 | 0.103 | 0.185 | 0.274 | 0.179 | 0.380 | 0.380 | 0.380 | 0.380 | 0.380 |
| CONDUCTIVIDAD | µ S/cm | 165.5 | 156.6 | 229.0 | 235.0 | 248.0 | 257.000 | 206 | 181.5 | 361.0 | 202.0 | 143.5 | 143.5 | 143.5 | 143.5 | 143.5 |
| SOLIDOS DISUELTOS | mg/L | 82.8 | 78.3 | 114.5 | 117.5 | 124.0 | 128.5 | 103 | 90.8 | 180.5 | 101.0 | 71.8 | 71.8 | 71.8 | 71.8 | 71.8 |
| NITRATOS | mg/L | No Se Detectd | No Se Detectd | No Se Detectd | No Se Detectd | No Se Detectd | No Se Detectd | No Se Detectd | No Se Detectd | No Se Detectd | No Se Detectd | No Se Detectd | No Se Detectd | No Se Detectd | No Se Detectd | No Se Detectd |
| NITRITOS | mg/L | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| OXIGENO DISUELTO | mg/L | 0.8 | 0.8 | 0.7 | 0.7 | 0.7 | 0.7 | 0.7 | 0.8 | 0.7 | 0.9 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 |
| CLORUROS | mg/L | No Se Detectd | No Se Detectd | No Se Detectd | No Se Detectd | No Se Detectd | No Se Detectd | No Se Detectd | No Se Detectd | No Se Detectd | No Se Detectd | No Se Detectd | No Se Detectd | No Se Detectd | No Se Detectd | No Se Detectd |
| DUREZA TOTAL | mg/L | 41 | 88 | 85.0 | 91.0 | 104.0 | 100.0 | 105 | 60.0 | 137.0 | 45.0 | 55.0 | 55.0 | 55.0 | 55.0 | 55.0 |
| MAGNESIO | mg/L | 3.6 | 9.6 | 8.8 | 9.12 | 10.6 | 10.8 | 12.48 | 6.0 | 13.4 | 4.8 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 |
| CALCIO | mg/L | 10.4 | 19.2 | 19.2 | 21.1 | 24.0 | 22.0 | 21.2 | 14.0 | 32.4 | 10.0 | 12.0 | 12.0 | 12.0 | 12.0 | 12.0 |
| HIERRO TOTAL | mg/L | 0.00 | 0.01 | 0.00 | 0.00 | 0.23 | 0.04 | 0.00 | 0.02 | 0.02 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| MANGANESO | mg/L | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| SULFATOS | mg/L | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 20.4 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| COBRE | mg/L | 0.00 | 0.00 | 0.00 | 0.00 | 0.02 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| FLUORURO | mg/L | 0.00 | 0.08 | 0.05 | 0.06 | 0.03 | 0.00 | 0.00 | 0.03 | 0.00 | 0.11 | 0.04 | 0.04 | 0.04 | 0.04 | 0.04 |
| CROMO | mg/L | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| CIANURO | mg/L | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| CADMIO | mg/L | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| ARSENICO | mg/L | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| PLOMO | mg/L | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 | 0.01 | 0.01 | 0.00 | 0.01 | 0.00 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 |
| Coliformes totales | JFC/100ml | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Coliformes fecales | JFC/100ml | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |



LABORATORIO QUIMICO
Microbiologico



FECHA RECIBIDA: 21/1/2,004

FECHA DE ENTREGA: 4/2/2,004

| Característica | UNIDAD | COGUANOR | | NACIMIENTOS | | |
|--------------------|-----------|---------------|---------------|--------------------|------------------|------------------|
| | | LMA | LMP | CUC MOLINO QUETZAL | CUC 3 SANTA RITA | ENTRADA AL TUNEL |
| OLOR | | NO RECHAZABLE | NO RECHAZABLE | ACEPTABLE | ACEPTABLE | ACEPTABLE |
| SABOR | | NO RECHAZABLE | NO RECHAZABLE | ACEPTABLE | ACEPTABLE | ACEPTABLE |
| COLOR | | | | INCOLORO | INCOLORO | INCOLORO |
| PH | | 7.0-7.5 | 6.5-8.5 | 7.00 | 7.0 | 7.00 |
| TEMPERATURA °C | °C | 18.0 -30.0 | <34.0 | 17.5 | 17.9 | 17.5 |
| TURBIDEZ/UNT | UNT | 5.0 | 15.0 | 0.125 | 0.142 | 0.131 |
| CONDUCTIVIDAD | µ S/cm | 100-750 | <1,500 | 162.6 | 132.7 | 166.8 |
| SOLIDOS DISUELTOS | mg/L | 500.0 | 1000.0 | 81.3 | 66.35 | 83.4 |
| NITRATOS | mg/L | - | 10 | ND | ND | ND |
| NITRITOS/mg/L | mg/L | - | 1 | 0.00 | 0.00 | 0.00 |
| OXIGENO DISUELTO | mg/L | - | - | 0.3 | 0.5 | 0.2 |
| CLORURO | mg/L | 100.000 | 250.000 | ND | ND | ND |
| DUREZA TOTAL/mg/L | mg/L | 100.000 | 500.000 | 60 | 48 | 60 |
| MAGNESIO/mg/L | mg/L | 50.000 | 100.000 | 5.2 | 3.5 | 6 |
| CALCIO/mg/L | mg/L | 75.000 | 150.000 | 14.8 | 13.4 | 14 |
| HIERRO TOTAL/mg/L | mg/L | 0.100 | 1.000 | 0.01 | 0.00 | 0.01 |
| MANGANESO | mg/L | 0.050 | 0.500 | 0.00 | 0.00 | 0.00 |
| SULFATO mg/L | mg/L | 100.000 | 250.000 | 0.00 | 0.00 | 0.00 |
| COBRE mg/L | mg/L | 0.050 | 1.500 | 0.00 | 0.00 | 0.00 |
| FLUORURO mg/L | mg/L | - | 1.700 | 0.00 | 0.00 | 0.00 |
| CROMO mg/L | mg/L | - | 0.050 | 0.00 | 0.00 | 0.00 |
| CIANURO | mg/L | - | 0.070 | 0.00 | 0.00 | 0.00 |
| CADMIO mg/L | mg/L | - | 0.003 | 0.00 | 0.00 | 0.00 |
| ARSENICO | mg/L | - | 0.010 | 0.00 | 0.00 | 0.00 |
| PLOMO/mg/L | mg/L | - | 0.010 | 0.00 | 0.00 | 0.00 |
| Coliformes totales | UFC/100ml | 1 | 1 | 11 | 2 | 13 |
| Coliformes fecales | UFC/100ml | 0 | 0 | 0 | 0 | 0 |



LABORATORIO QUIMICO
Microbiologico



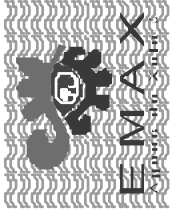
FECHA RECIBIDA: 21/1/2,004

FECHA DE ENTREGA: 4/2/2,004

| Característica | UNIDAD | POZOS | | | | | | | | | | | | |
|--------------------|-----------|-----------|-------------------|-----------|-----------|------------|------------|-----------|-----------|-----------|-----------|---------------|-----------|--|
| | | CHITUX | SALIDA SAN MARCOS | FLORESTA | ZONA 8 | SAN ISIDRO | DEMOCRACIA | ZOOLOGICO | PARAIZO | PACAJA | AMERICAS | BENITO JUAREZ | | |
| OLOR | | ACEPTABLE | ACEPTABLE | ACEPTABLE | ACEPTABLE | ACEPTABLE | ACEPTABLE | ACEPTABLE | ACEPTABLE | ACEPTABLE | ACEPTABLE | ACEPTABLE | ACEPTABLE | |
| SABOR | | ACEPTABLE | ACEPTABLE | ACEPTABLE | ACEPTABLE | ACEPTABLE | ACEPTABLE | ACEPTABLE | ACEPTABLE | ACEPTABLE | ACEPTABLE | ACEPTABLE | ACEPTABLE | |
| COLOR | | INCOLORO | INCOLORO | INCOLORO | INCOLORO | INCOLORO | INCOLORO | INCOLORO | INCOLORO | INCOLORO | INCOLORO | INCOLORO | INCOLORO | |
| PH | | 7.6 | 7.5 | 7.6 | 7.5 | 7.7 | 7.6 | 7.5 | 7.7 | 7.6 | 7.5 | 7.6 | 7.6 | |
| TEMPERATURA °C | °C | 14 | 13 | 14.7 | 15 | 15 | 15 | 16.8 | 15.3 | 17 | 15 | 17.4 | 17.4 | |
| TURBIDEZ/UNT | UNT | 0.19 | 0 | 0.13 | 0.115 | 0.109 | 0.125 | 0.150 | 0.158 | 0.154 | 0.270 | 0.100 | 0.100 | |
| CONDUCTIVIDAD | µ S/cm | 128.7 | 150 | 144.9 | 139.6 | 140.2 | 133.6 | 152.7 | 214 | 269 | 333.0 | 199.5 | 199.5 | |
| SOLIDOS DISUELTOS | mg/L | 64.35 | 149.3 | 72.45 | 69.8 | 70.1 | 66.8 | 76.35 | 107.0 | 134.5 | 166.5 | 99.75 | 99.75 | |
| NITRATOS /mg/L | mg/L | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | |
| NITRITOS/mg/L | mg/L | 0.002 | 0.001 | 0.002 | 0.002 | 0.00 | 0.001 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | |
| OXIGENO DISUELTO | mg/L | 0.6 | 0.7 | 0.4 | 0.5 | 0.7 | 0.7 | 0.6 | 0.5 | 0.7 | 0.6 | 0.6 | 0.6 | |
| CLORUROS | mg/L | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | |
| DUREZA TOTAL/mg/L | mg/L | 50 | 55 | 50 | 50 | 50 | 45 | 50 | 90.0 | 105 | 143.0 | 75 | 75 | |
| MAGNESIO/mg/L | mg/L | 6 | 5.52 | 4.8 | 4.8 | 5.04 | 3.6 | 4.8 | 8.40 | 10.08 | 18.0 | 7.92 | 7.92 | |
| CALCIO/mg/L | mg/L | 10 | 12.8 | 12 | 12 | 11.6 | 12 | 12 | 2.2 | 25.2 | 27.2 | 18.8 | 18.8 | |
| HIERRO TOTAL/mg/L | mg/L | 0.01 | 0.01 | 0 | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 | 0.00 | 0.00 | 0.00 | |
| MANGANESO | mg/L | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | |
| SULFATO mg/L | mg/L | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.0 | 0.02 | 0.0 | 0.00 | 0.00 | |
| COBRE mg/L | mg/L | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | |
| FLUORURO mg/L | mg/L | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 | 0.00 | 0.00 | 0.02 | 0.03 | 0.02 | 0 | 0 | |
| CROMO mg/L | mg/L | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | |
| CIANURO | mg/L | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | |
| CADMIO mg/L | mg/L | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | |
| ARSENICO | mg/L | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | |
| PLOMO/mg/L | mg/L | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | |
| Coliformes totales | UFC/100ml | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| Coliformes fecales | UFC/100ml | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |



LABORATORIO QUIMICO
Microbiologico



FECHA RECIBIDA: 21/11/2.004

FECHA DE ENTREGA: 4/2/2.004

| Característica | UNIDAD | POZOS | | | | | | | | | | | | | | |
|--------------------|-----------|--|---|--|--|--|--|--|---|---|--|---|-------|-------|-------|-------|
| | | CEFEMERQ ACEPTABLE ACEPTABLE INCOLORO | CHOQUI ALTO ACEPTABLE ACEPTABLE INCOLORO | CHIRRIEZ 1 ACEPTABLE ACEPTABLE INCOLORO | CHIRRIEZ 4 ACEPTABLE ACEPTABLE INCOLORO | CHIRRIEZ 5 ACEPTABLE ACEPTABLE INCOLORO | CHIRRIEZ 6 ACEPTABLE ACEPTABLE INCOLORO | CHIRRIEZ 7 ACEPTABLE ACEPTABLE INCOLORO | ROTONDA ACEPTABLE ACEPTABLE INCOLORO | CENIZAL ACEPTABLE ACEPTABLE INCOLORO | XEUL ACEPTABLE ACEPTABLE INCOLORO | ROSAS ACEPTABLE ACEPTABLE INCOLORO | | | | |
| PH | | 7.6 | 7.9 | 7.7 | 7.6 | 7.5 | 7.8 | 7.7 | 7.7 | 7.5 | 7.8 | 7.7 | 7.7 | 7.5 | 7.9 | 7.5 |
| TEMPERATURA °C | °C | 16.8 | 16.6 | 17 | 16.7 | 16.2 | 17.1 | 16.6 | 16.6 | 16.2 | 17.1 | 16.6 | 16.6 | 13.2 | 13.4 | 13.8 |
| TURBIDEZ/JUNT | UNT | 0.100 | 0.110 | 0.130 | 0.125 | 0.332 | 0.165 | 0.142 | 0.142 | 0.332 | 0.165 | 0.142 | 0.160 | 0.147 | 0.165 | 0.151 |
| CONDUCTIVIDAD | µ S/cm | 145 | 134.9 | 219.0 | 227.0 | 240.0 | 254.000 | 258 | 258 | 240.0 | 254.000 | 258 | 182.4 | 379.0 | 182.0 | 130.5 |
| SOLIDOS DISUELTOS | mg/L | 72.5 | 67.45 | 109.5 | 113.5 | 120.0 | 127.0 | 129 | 129 | 120.0 | 127.0 | 129 | 81.2 | 189.5 | 91.0 | 65.0 |
| NITRATOS | mg/L | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| NITRITOS/mg/L | mg/L | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| OXIGENO DISUELTO | mg/L | 0.5 | 0.6 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.7 | 0.5 | 0.7 | 0.1 |
| CLORUROS | mg/L | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| DUREZA TOTAL/mg/L | mg/L | 45 | 100 | 85.0 | 87.0 | 95.0 | 102.0 | 110 | 110 | 95.0 | 102.0 | 110 | 60.0 | 168.0 | 55.0 | 45.0 |
| MAGNESIO/mg/L | mg/L | 3.6 | 10.8 | 8.8 | 8.40 | 8.88 | 10.8 | 12.72 | 12.72 | 8.88 | 10.8 | 12.72 | 5.5 | 19.0 | 4.8 | 3.5 |
| CALCIO/mg/L | mg/L | 12 | 22 | 19.2 | 20.8 | 23.2 | 22.8 | 22.8 | 22.8 | 23.2 | 22.8 | 22.8 | 14.8 | 35.6 | 14.0 | 12.0 |
| HIERRO TOTAL/mg/L | mg/L | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 | 1.00 | 0.01 | 0.01 | 0.01 | 1.00 | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 |
| MANGANESO | mg/L | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| SULFATO mg/L | mg/L | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.0 | 0.00 | 0.00 |
| COBRE mg/L | mg/L | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| FLUORURO mg/L | mg/L | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.12 | 0.06 | 0.00 |
| CROMO mg/L | mg/L | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| CIANURO | mg/L | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| CADMIO mg/L | mg/L | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| ARSENICO | mg/L | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| PLOMO/mg/L | mg/L | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Coliformes totales | UFC/100ml | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Coliformes fecales | UFC/100ml | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

9.5 漏水件数データ

漏水件数

件数

| 年度 | 月 | 行政区 | | | | | | | | | | 計 |
|------|----|-----|-----|-----|-----|-----|----|----|----|-----|----|------|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | |
| 2002 | 1 | 15 | 3 | 5 | | 3 | | 3 | 1 | 5 | 2 | 37 |
| | 2 | 15 | 1 | 7 | 1 | 4 | 1 | 3 | 2 | 3 | 5 | 42 |
| | 3 | 7 | 3 | 5 | 1 | 1 | | | | 1 | 3 | 21 |
| | 4 | 9 | 2 | 7 | 3 | 3 | 1 | 4 | 1 | 4 | 2 | 36 |
| | 5 | | | | | | | | | | 3 | 3 |
| | 6 | 13 | 3 | 12 | 2 | 3 | 2 | | 2 | 3 | | 40 |
| | 7 | 14 | 5 | 10 | 3 | 6 | 3 | | 3 | 5 | 3 | 52 |
| | 8 | 14 | 2 | 7 | 1 | 5 | 1 | | 2 | 4 | 1 | 37 |
| | 9 | 11 | 2 | 1 | 3 | 4 | 3 | 3 | | 4 | 3 | 34 |
| | 10 | 18 | 3 | 5 | 2 | 3 | 2 | 2 | 3 | 4 | 1 | 43 |
| | 11 | 16 | 4 | 13 | 3 | 3 | 1 | 5 | 4 | 5 | 1 | 55 |
| | 12 | 8 | 4 | 13 | 2 | 6 | 1 | 2 | | 4 | 1 | 41 |
| 2003 | 1 | 21 | 5 | 8 | | 8 | 1 | 6 | 4 | 8 | 1 | 62 |
| | 2 | 8 | 1 | 5 | | 3 | 7 | 2 | 2 | 3 | 3 | 34 |
| | 3 | 30 | | 8 | 3 | 9 | 1 | 1 | 1 | 3 | 3 | 59 |
| | 4 | 18 | 6 | 3 | 3 | 9 | | 3 | 2 | 5 | 4 | 53 |
| | 5 | 18 | 2 | 9 | | 2 | | 3 | | 5 | 2 | 41 |
| | 6 | | | | | | | | | | | 0 |
| | 7 | | | | | | | | | | | 0 |
| | 8 | | | | | | | | | | | 0 |
| | 9 | | | | | | | | | | | 0 |
| | 計 | | 235 | 46 | 118 | 27 | 72 | 24 | 37 | 27 | 66 | 38 |
| | | 34% | 7% | 17% | 4% | 10% | 3% | 5% | 4% | 10% | 6% | 100% |

管口径別漏水件数

件数

| 管口径(ｲﾝﾁ) | 行政区 | | | | | | | | | | 計 | | |
|----------|-----|-----|----|-----|----|----|----|----|----|----|----|-----|------|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | | | |
| 0.25 | 1 | | | | | | | | | | | 1 | 0% |
| 0.50 | 13 | | 6 | 2 | 3 | | 2 | | 5 | | | 31 | 4% |
| 0.75 | 93 | 20 | 46 | 5 | 17 | 7 | 16 | 6 | 11 | 13 | | 234 | 34% |
| 1.00 | 22 | | 7 | | 5 | 5 | 2 | 2 | 8 | 5 | | 56 | 8% |
| 1.25 | 4 | 1 | 4 | | 1 | | 1 | 1 | 3 | | | 15 | 2% |
| 1.50 | 7 | | 2 | | 2 | 1 | 2 | 2 | 8 | 1 | | 25 | 4% |
| 2.00 | 48 | 15 | 26 | 10 | 29 | 2 | 9 | 13 | 6 | 15 | | 173 | 25% |
| 3.00 | 21 | 3 | 3 | 3 | 3 | 8 | 2 | 2 | | 1 | | 46 | 7% |
| 4.00 | 13 | 3 | 4 | 6 | 10 | | 2 | 1 | 11 | 3 | | 53 | 8% |
| 5.00 | | | | | | | | | | | | 0 | 0% |
| 6.00 | 1 | 4 | 11 | | 2 | | | | 14 | | | 32 | 5% |
| 7.00 | | | | | | | | | | | | 0 | 0% |
| 8.00 | 11 | | 7 | 1 | | 1 | 1 | | | | | 21 | 3% |
| 9.00 | | | | | | | | | | | | 0 | 0% |
| 10.00 | | | | | | | | | | | | 0 | 0% |
| 14.00 | 1 | | 2 | | | | | | | | | 3 | 0% |
| 計 | | | | | | | | | | | | 0 | 0% |
| | | 235 | 46 | 118 | 27 | 72 | 24 | 37 | 27 | 66 | 38 | 690 | 100% |

出典：EMAX運転管理部資料

9.6 顧客からの苦情データ

件数

| 2001年度 | 月 | | | | | | | | | | | | 計 | 比率 | |
|--------------|-----|-----|----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-------|------|--|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | | | |
| 行政区 | | | | | | | | | | | | | | | |
| 1区 | 31 | 38 | 30 | 37 | 109 | 63 | 94 | 119 | 122 | 110 | 49 | 49 | 851 | 41% | |
| 2区 | 7 | 10 | 7 | 7 | 13 | 10 | 3 | 3 | 4 | 3 | 7 | 7 | 81 | 4% | |
| 3区 | 27 | 29 | 21 | 26 | 29 | 30 | 41 | 51 | 53 | 50 | 25 | 25 | 407 | 20% | |
| 4区 | 15 | 10 | 14 | 16 | 6 | 7 | 12 | 12 | 11 | 10 | 3 | 3 | 119 | 6% | |
| 5区 | 5 | 16 | 6 | 6 | 5 | 11 | 8 | 13 | 15 | 13 | 26 | 26 | 150 | 7% | |
| 6区 | 4 | 4 | 2 | 3 | 7 | 5 | 4 | 4 | 6 | 4 | 3 | 3 | 49 | 2% | |
| 7区 | 3 | 4 | 4 | 4 | 61 | 15 | 3 | 3 | 3 | 3 | 21 | 21 | 145 | 7% | |
| 8区 | 10 | 13 | 6 | 8 | 20 | 14 | 5 | 10 | 12 | 6 | 21 | 21 | 146 | 7% | |
| 9区 | 0 | 0 | 0 | 0 | 9 | 23 | 2 | 4 | 4 | 3 | 14 | 14 | 73 | 3% | |
| 10区 | 0 | 0 | 0 | 0 | 5 | 6 | 1 | 4 | 4 | 2 | 8 | 8 | 38 | 2% | |
| 11区 | 0 | 0 | 0 | 0 | 0 | 3 | | | | | | | 3 | 0% | |
| 農村部 | | | | | | | 5 | 5 | 7 | 5 | 1 | 1 | 24 | 1% | |
| 計 | 102 | 124 | 90 | 107 | 264 | 187 | 178 | 228 | 241 | 209 | 178 | 178 | 2,086 | 100% | |
| 苦情内容 | | | | | | | | | | | | | | | |
| 1. フィルターの清掃 | 10 | 12 | 10 | 11 | 21 | 13 | 1 | 1 | 3 | 1 | 1 | 1 | 85 | 4% | |
| 1. メーターの漏水 | 33 | 38 | 30 | 33 | 27 | 34 | 24 | 34 | 39 | 30 | 25 | 25 | 372 | 18% | |
| 3. 給水管の漏水 | 24 | 20 | 15 | 25 | 45 | 39 | 13 | 33 | 33 | 28 | 35 | 35 | 345 | 17% | |
| 4. 各戸給水の断水 | 20 | 26 | 20 | 21 | 15 | 22 | 6 | 6 | 17 | 6 | 5 | 5 | 169 | 8% | |
| 5. 配水区の断水 | 11 | 25 | 8 | 15 | 144 | 67 | 99 | 119 | 120 | 114 | 83 | 83 | 888 | 43% | |
| 6. 圧力不足 | 4 | 3 | 7 | 2 | 12 | 12 | | | | | | | 40 | 2% | |
| 7. メーターの設置不良 | | | | | | | 31 | 31 | 15 | 26 | 23 | 23 | 149 | 7% | |
| 8. 不法接続、不正使用 | | | | | | | | | | | 5 | 5 | 10 | 0% | |
| 9. 濁りあり | | | | | | | 2 | 2 | 7 | 2 | 1 | 1 | 15 | 1% | |
| 10. 道路の修理 | | | | | | | 2 | 2 | 7 | 2 | | | 13 | 1% | |
| 計 | 102 | 124 | 90 | 107 | 264 | 187 | 178 | 228 | 241 | 209 | 178 | 178 | 2,086 | 100% | |

件数

| 2002年度 | 月 | | | | | | | | | | | | 計 | 比率 |
|--------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|----|----|----|-------|------|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | | |
| 行政区 | | | | | | | | | | | | | | |
| 1区 | 113 | 99 | 49 | 52 | 59 | 82 | 80 | 80 | 53 | | | | 667 | 33% |
| 2区 | 11 | 12 | 7 | 14 | 7 | 22 | 12 | 12 | 10 | | | | 107 | 5% |
| 3区 | 46 | 19 | 25 | 37 | 39 | 51 | 3 | 43 | 30 | | | | 293 | 14% |
| 4区 | 7 | 15 | 3 | 13 | 13 | 6 | 8 | 8 | 8 | | | | 81 | 4% |
| 5区 | 17 | 26 | 26 | 14 | 17 | 29 | 35 | 45 | 35 | | | | 244 | 12% |
| 6区 | 3 | 18 | 3 | 9 | 7 | 7 | 8 | 8 | 6 | | | | 69 | 3% |
| 7区 | 16 | 12 | 21 | 36 | 19 | 10 | 13 | 23 | 34 | | | | 184 | 9% |
| 8区 | 7 | 19 | 21 | 11 | 8 | 12 | 12 | 12 | 4 | | | | 106 | 5% |
| 9区 | 8 | 25 | 14 | 16 | 16 | 8 | 2 | 32 | 11 | | | | 132 | 6% |
| 10区 | 6 | 7 | 8 | 17 | 12 | 5 | 11 | 22 | 12 | | | | 100 | 5% |
| 11区 | | | | | | | | | | | | | 0 | 0% |
| 農村部 | 3 | 12 | 1 | 9 | 9 | 4 | 5 | 10 | 7 | | | | 60 | 3% |
| 計 | 237 | 264 | 178 | 228 | 206 | 236 | 189 | 295 | 210 | 0 | 0 | 0 | 2,043 | 100% |
| 苦情内容 | | | | | | | | | | | | | | |
| 1. フィルターの清掃 | 3 | 12 | 1 | 3 | 1 | 1 | 3 | 3 | 7 | | | | 34 | 2% |
| 2. メーターの漏水 | 27 | 14 | 25 | 26 | 28 | 25 | 11 | 31 | 17 | | | | 204 | 10% |
| 3. 給水管の漏水 | 42 | 38 | 35 | 39 | 43 | 49 | 16 | 26 | 42 | | | | 330 | 16% |
| 4. 各戸給水の断水 | 12 | 45 | 5 | 32 | 21 | 24 | 15 | 35 | 4 | | | | 193 | 9% |
| 5. 配水区の断水 | 116 | 133 | 83 | 87 | 92 | 109 | 103 | 164 | 132 | | | | 1,019 | 50% |
| 6. 圧力不足 | | | | | | | | | | | | | 0 | 0% |
| 7. メーターの設置不良 | 25 | 19 | 23 | 29 | 15 | 22 | 25 | 25 | 4 | | | | 187 | 9% |
| 8. 不法接続、不正使用 | 5 | 3 | 5 | 4 | 3 | 2 | 10 | 5 | 1 | | | | 38 | 2% |
| 9. 濁りあり | | | | | | | | | | | | | 0 | 0% |
| 10. 道路の修理 | 7 | 0 | 1 | 8 | 3 | 4 | 6 | 6 | 3 | | | | 38 | 2% |
| 計 | 237 | 264 | 178 | 228 | 206 | 236 | 189 | 295 | 210 | 0 | 0 | 0 | 2,043 | 100% |

件数

| 2003年度 | 月 | | | | | | | | | | | | 計 | 比率 | |
|-------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-------|------|--|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | | | |
| 行政区 | | | | | | | | | | | | | | | |
| 1区 | 69 | 78 | 63 | 71 | 66 | 54 | 51 | 49 | 31 | 43 | 47 | 51 | 673 | 27% | |
| 2区 | 15 | 16 | 8 | 8 | 9 | 8 | 12 | 9 | 5 | 11 | 13 | 11 | 125 | 5% | |
| 3区 | 34 | 39 | 25 | 27 | 36 | 36 | 39 | 31 | 23 | 28 | 33 | 28 | 379 | 15% | |
| 4区 | 11 | 18 | 16 | 22 | 8 | 9 | 21 | 11 | 16 | 9 | 16 | 21 | 178 | 7% | |
| 5区 | 42 | 31 | 28 | 21 | 24 | 15 | 27 | 13 | 21 | 17 | 21 | 24 | 284 | 11% | |
| 6区 | 6 | 14 | 7 | 8 | 2 | 0 | 4 | 3 | 27 | 8 | 7 | 6 | 92 | 4% | |
| 7区 | 9 | 11 | 11 | 9 | 13 | 11 | 9 | 8 | 38 | 12 | 11 | 10 | 152 | 6% | |
| 8区 | 10 | 9 | 42 | 13 | 13 | 13 | 9 | 5 | 4 | 13 | 31 | 9 | 171 | 7% | |
| 9区 | 15 | 8 | 9 | 17 | 4 | 15 | 17 | 11 | 5 | 13 | 15 | 13 | 142 | 6% | |
| 10区 | 13 | 6 | 14 | 8 | 11 | 19 | 12 | 9 | 13 | 15 | 14 | 9 | 143 | 6% | |
| 11区 | | | | | | | | | 0 | 0 | 1 | 1 | 2 | 0% | |
| 農村部 | 25 | 14 | 12 | 17 | 23 | 10 | 14 | 7 | 13 | 13 | 12 | 11 | 171 | 7% | |
| 計 | 249 | 244 | 235 | 221 | 209 | 190 | 215 | 156 | 196 | 182 | 221 | 194 | 2,512 | 100% | |
| 苦情内容 | | | | | | | | | | | | | | | |
| 1.フィルターの清掃 | 4 | | 7 | 7 | 8 | 4 | 8 | 2 | 1 | 1 | 2 | 1 | 45 | 2% | |
| 2.メーターの漏水 | 34 | 42 | 24 | 28 | 34 | 25 | 33 | 20 | 27 | 25 | 27 | 29 | 348 | 14% | |
| 3.給水管の漏水 | 52 | 41 | 46 | 35 | 41 | 53 | 45 | 26 | 31 | 39 | 38 | 36 | 483 | 19% | |
| 4.各戸給水の断水 | 12 | 16 | 18 | 14 | 7 | 7 | 9 | 8 | 7 | 6 | 11 | 7 | 122 | 5% | |
| 5.配水区の断水 | 89 | 81 | 96 | 101 | 96 | 80 | 92 | 63 | 115 | 88 | 113 | 92 | 1,106 | 44% | |
| 6.メーターの設置不良 | 38 | 28 | 17 | 22 | 18 | 19 | 11 | 17 | 9 | 8 | 13 | 18 | 218 | 9% | |
| 7.不法接続、不正使用 | | 8 | 5 | 5 | 2 | | 2 | 3 | 2 | 3 | 4 | 2 | 36 | 1% | |
| 8.濁りあり | | | | | | | | 2 | 0 | 2 | 2 | 1 | 7 | 0% | |
| 9.時間給水無し | 14 | 19 | 22 | 9 | 3 | 2 | 15 | 12 | 2 | 7 | 7 | 4 | 116 | 5% | |
| 10.給水栓の交換 | 6 | 9 | | | | | | 3 | 2 | 3 | 4 | 4 | 31 | 1% | |
| 計 | 249 | 244 | 235 | 221 | 209 | 190 | 215 | 156 | 196 | 182 | 221 | 194 | 2,512 | 100% | |

| 苦情数順位(行政区) | 1位 | 2位 | 3位 | 4位 | 5位 | 6位 | 7位 | 8位 | 9位 | 10位 | 11位 |
|------------|----|----|----|----|----|----|----|----|----|-----|-----|
| 2001年度 | 1 | 3 | 5 | 8 | 7 | 4 | 2 | 9 | 6 | 10 | 11 |
| 2002年度 | 1 | 3 | 5 | 7 | 9 | 2 | 8 | 10 | 4 | 6 | 11 |
| 2003年度 | 1 | 3 | 5 | 4 | 8 | 7 | 10 | 9 | 2 | 6 | 11 |
| 平均 | 1 | 3 | 5 | 7 | 8 | 4 | 9 | 2 | 10 | 6 | 11 |

| 苦情内容順位 | 1位 | 2位 | 3位 | 4位 | 5位 | 6位 |
|--------|----|----|----|----|----|----|
| 2001年度 | 5 | 2 | 3 | 4 | 7 | 1 |
| 2002年度 | 5 | 3 | 2 | 4 | 7 | 10 |
| 2003年度 | 5 | 3 | 2 | 7 | 4 | 10 |
| 平均 | 5 | 3 | 2 | 4 | 7 | 10 |

出典：EMAX顧客サービス部資料

9.7 給水需要量の推定

| Zone | Group | Pop. Density (person/ha) |
|------|-------|--------------------------|
| 1 | G1 | 91.94 |
| 7 | G2 | 59.02 |
| 3 | G2 | 57.07 |
| 4 | G2 | 54.75 |
| 2 | G2 | 46.01 |
| 5 | G3 | 27.87 |
| 10 | G3 | 27.56 |
| 6 | G3 | 21.97 |
| 8 | G4 | 16.81 |
| 9 | G4 | 14.52 |
| 11 | G4 | 9.29 |

| Area (ha) | Population | | Population Density | |
|------------------------|------------|---------|--------------------|--------|
| | 2000 | 2008 | 2000 | 2008 |
| Z 1 | 36,234 | 43,124 | 91.94 | 109.42 |
| Z 2 | 3,922 | 4,930 | 46.01 | 57.83 |
| Z 3 | 19,938 | 25,063 | 57.07 | 71.74 |
| Z 4 | 2,987 | 3,755 | 54.75 | 68.82 |
| Z 5 | 314.34 | 12,271 | 27.87 | 39.04 |
| Z 6 | 4,417 | 6,186 | 21.97 | 30.77 |
| Z 7 | 11,263 | 14,158 | 59.02 | 74.19 |
| Z 8 | 367.10 | 8,641 | 16.81 | 23.54 |
| Z 9 | 5,565 | 7,794 | 14.52 | 20.34 |
| Z 10 | 170.47 | 4,698 | 27.56 | 38.60 |
| Z 11 | 277.00 | 3,602 | 9.29 | 13.00 |
| Population not counted | 13,000 | 18,000 | | |
| 2787.19 | 119,528 | 154,104 | 42.88 | 55.29 |

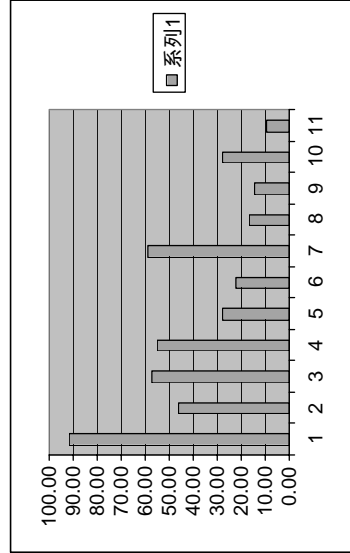
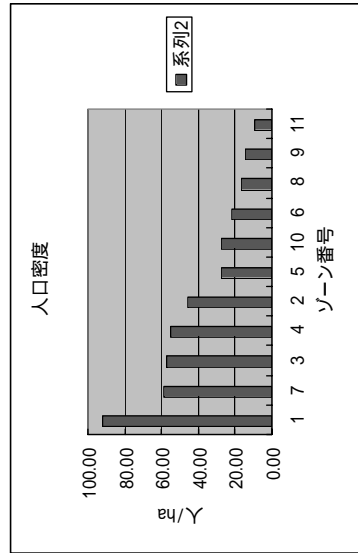
Note: Area excludes those of the cemetery and zoo.

Population Growth Rate Applied

| | 2000-2008 | 2008-2018 |
|----|-----------|-----------|
| G1 | 2.2 | 2.1 |
| G2 | 2.9 | 2.8 |
| G3 | 4.3 | 4.2 |
| G4 | 4.3 | 4.2 |

| | 2000 | 2008 | 2018 |
|--------------------------------------|---------|---------|---------|
| Urban Population | 119,528 | 154,104 | 208,875 |
| Population not counted in the census | 0.122 | 0.132 | 0.130 |

| Zone | Population after Adjustment | | |
|-------|-----------------------------|---------|---------|
| | 2000 | 2008 | 2018 |
| Z1 | 40,656 | 48,828 | 60,213 |
| Z2 | 4,401 | 5,582 | 7,361 |
| Z3 | 22,371 | 28,378 | 37,419 |
| Z4 | 3,352 | 4,251 | 5,606 |
| Z5 | 9,831 | 13,894 | 21,001 |
| Z6 | 4,956 | 7,004 | 10,587 |
| Z7 | 12,637 | 16,031 | 21,138 |
| Z8 | 6,923 | 9,784 | 14,788 |
| Z9 | 6,244 | 8,824 | 13,338 |
| Z10 | 5,271 | 7,450 | 11,260 |
| Z11 | 2,886 | 4,078 | 6,164 |
| Total | 119,528 | 154,104 | 208,875 |



Area by Zone (ha)

| | Pressure Zone | | | | | | Total |
|--------|---------------|------|--------|------|-------|-------|-------|
| | Rosario Bajo | Alta | Alta 1 | Baja | Media | Baul | |
| Zone 1 | | | | | 212 | 209 | 421 |
| 2 | 84 | | | | | | 84 |
| 3 | | | | | 51 | 306 | 357 |
| 4 | | | | | 36 | 15 | 55 |
| 5 | | | | | 236 | 3 | 248 |
| 6 | | | | | 78 | 114 | 192 |
| 7 | | | | | 32 | 158 | 190 |
| 8 | | 157 | 2 | | 5 | 202 | 366 |
| 9 | | 166 | 128 | | | 89 | 383 |
| 10 | | | | | | 101 | 160 |
| 11 | | | | | 65 | | 65 |
| Total | 84 | 382 | 130 | | 715 | 1,197 | 2,521 |

Note:

- 1) Service coverage in Zone 11 will increase from 2% in 2000 to 30% in 2008 and 60% in 2018.
- 2) Population served in 2000, 2008 and 2018 are provisional estimates, subject to further review. When you want to change future population, zonal population served envisaged in this worksheet requires adjustment by manually.

2000 Population by Administrative and Pressure Zone

| | Pressure Zone | | | | | | Total |
|--------|---------------|-------|--------|--------|--------|-------|---------|
| | Rosario Bajo | Alta | Alta 1 | Baja | Media | Baul | |
| Zone 1 | | | | 20,473 | 20,183 | | 40,656 |
| 2 | 4,401 | | | | | | 4,401 |
| 3 | | | | 3,196 | 19,175 | | 22,371 |
| 4 | | | | 2,194 | 914 | 244 | 3,352 |
| 5 | | | | 9,356 | 119 | 357 | 9,831 |
| 6 | | | | 2,013 | 2,943 | 4,956 | 9,912 |
| 7 | | | | 2,128 | 10,509 | | 12,637 |
| 8 | | 2,970 | 38 | | 85 | 3,821 | 6,923 |
| 9 | | 2,706 | 2,087 | | 1,451 | | 6,244 |
| 10 | | 1,946 | | | | 3,325 | 5,271 |
| 11 | | | | | 2,886 | | 2,886 |
| Total | 4,401 | 7,622 | 2,125 | 42,340 | 62,440 | 601 | 119,528 |

2000 Population Served by Administrative and Pressure Zone

| | Pressure Zone | | | | | | Total |
|--------|---------------|-------|--------|------|--------|--------|--------|
| | Rosario Bajo | Alta | Alta 1 | Baja | Media | Baul | |
| Zone 1 | | | | | 15,281 | 15,065 | 30,347 |
| 2 | 3,301 | | | | | | 3,301 |
| 3 | | | | | 2,500 | 15,000 | 17,501 |
| 4 | | | | | 1,839 | 766 | 2,809 |
| 5 | | | | | 6,125 | 78 | 6,436 |
| 6 | | | | | 1,542 | 2,254 | 3,797 |
| 7 | | | | | 1,667 | 8,229 | 9,895 |
| 8 | | 2,106 | 27 | | 67 | 2,710 | 4,909 |
| 9 | | 2,004 | 1,545 | | | 1,074 | 4,624 |
| 10 | | 1,499 | | | | 2,562 | 4,061 |
| 11 | | | | | 47 | | 47 |
| Total | 3,301 | 5,609 | 1,572 | | 29,068 | 47,738 | 87,726 |

2008 Population by Administrative and Pressure Zone

| | Pressure Zone | | | | | | Total |
|--------|---------------|--------|--------|--------|--------|-------|---------|
| | Rosario Bajo | Alta | Alta 1 | Baja | Media | Baul | |
| Zone 1 | | | | 24,588 | 24,240 | | 48,828 |
| 2 | 5,582 | | | | | | 5,582 |
| 3 | | | | 4,054 | 24,324 | | 28,378 |
| 4 | | | | 2,783 | 1,159 | 309 | 4,251 |
| 5 | | | | 13,222 | 168 | 504 | 13,894 |
| 6 | | | | 2,845 | 4,159 | | 7,004 |
| 7 | | | | 2,700 | 13,331 | | 16,031 |
| 8 | | 4,197 | 53 | | 5,400 | | 9,784 |
| 9 | | 3,825 | 2,949 | | 2,051 | | 8,824 |
| 10 | | 2,750 | | | | 4,889 | 7,450 |
| 11 | | | | | 4,078 | | 4,078 |
| Total | 5,582 | 10,772 | 3,003 | 54,403 | 79,531 | 813 | 154,104 |

2008 Population Served by Administrative and Pressure Zone

| | Pressure Zone | | | | | | Total |
|--------|---------------|-------|--------|------|--------|--------|---------|
| | Rosario Bajo | Alta | Alta 1 | Baja | Media | Baul | |
| Zone 1 | | | | | 21,018 | 20,721 | 41,739 |
| 2 | 4,815 | | | | | | 4,815 |
| 3 | | | | | 3,612 | 21,675 | 25,287 |
| 4 | | | | | 2,617 | 1,091 | 3,999 |
| 5 | | | | | 10,509 | 134 | 11,043 |
| 6 | | | | | 2,513 | 3,673 | 6,187 |
| 7 | | | | | 2,408 | 11,888 | 14,295 |
| 8 | | 3,517 | 45 | | 112 | 4,525 | 8,200 |
| 9 | | 3,301 | 2,545 | | | 1,770 | 7,615 |
| 10 | | 2,439 | | | | 4,167 | 6,606 |
| 11 | | | | | 1,202 | | 1,202 |
| Total | 4,815 | 9,256 | 2,590 | | 43,992 | 69,643 | 130,988 |

2018 Population by Administrative and Pressure Zone

| | Pressure Zone | | | | | | Total |
|--------|---------------|--------|--------|--------|---------|-------|---------|
| | Rosario Bajo | Alta | Alta 1 | Baja | Media | Baul | |
| Zone 1 | | | | 30,321 | 29,892 | | 60,213 |
| 2 | 7,361 | | | | | | 7,361 |
| 3 | | | | 5,346 | 32,074 | | 37,419 |
| 4 | | | | 3,669 | 1,529 | 408 | 5,606 |
| 5 | | | | 19,984 | 254 | 762 | 21,001 |
| 6 | | | | 4,301 | 6,286 | | 10,587 |
| 7 | | | | 3,560 | 17,578 | | 21,138 |
| 8 | | 6,344 | 81 | | 202 | 8,162 | 14,788 |
| 9 | | 5,781 | 4,458 | | | 3,099 | 13,338 |
| 10 | | 4,157 | | | | 7,103 | 11,280 |
| 11 | | | | | 6,164 | | 6,164 |
| Total | 7,361 | 16,281 | 4,538 | 73,548 | 103,977 | 1,170 | 208,875 |

2018 Population Served by Administrative and Pressure Zone

| | Pressure Zone | | | | | | Total |
|--------|---------------|--------|--------|------|--------|---------|---------|
| | Rosario Bajo | Alta | Alta 1 | Baja | Media | Baul | |
| Zone 1 | | | | | 28,671 | 28,265 | 56,936 |
| 2 | 7,043 | | | | | | 7,043 |
| 3 | | | | | 5,241 | 31,443 | 36,684 |
| 4 | | | | | 3,747 | 1,561 | 5,724 |
| 5 | | | | | 18,314 | 233 | 19,245 |
| 6 | | | | | 4,215 | 6,160 | 10,374 |
| 7 | | | | | 3,492 | 17,242 | 20,734 |
| 8 | | 6,010 | 77 | | 191 | 7,733 | 14,011 |
| 9 | | 5,581 | 4,303 | | | 2,992 | 12,876 |
| 10 | | 4,084 | | | | 6,978 | 11,062 |
| 11 | | | | | 3,742 | | 3,742 |
| Total | 7,043 | 15,674 | 4,380 | | 67,612 | 102,607 | 198,431 |

Water Demand Forecast

| | 2000 | 2008 | 2018 |
|---|---------|---------|---------|
| Population | | | |
| Total Urban | 119,528 | 154,104 | 208,875 |
| -Urban Population | 106,528 | 136,104 | 184,875 |
| -Population Not Counted | 13,000 | 18,000 | 24,000 |
| Population Served | | | |
| Service Coverage (%) | 75 | 85 | 95 |
| Population Served | 89,646 | 130,988 | 198,431 |
| -by house connections | 89,646 | 130,988 | 198,431 |
| -by public faucets | - | - | - |
| Water Demand | | | |
| 1. Domestic | | | |
| Unit water consumption (Lcd) | 150 | 155 | 160 |
| Water consumption per house (m3/day) | 0.806 | 0.832 | 0.859 |
| Domestic water requirement (m3/day) | 13,447 | 20,303 | 31,749 |
| 2. Commercial | | | |
| Commercial customers | 1,414 | 1,791 | 2,269 |
| Unit water consumption (m3/day) | 1.5 | 1.5 | 1.5 |
| Commercial water requirement (m3/day) | 2,134 | 2,703 | 3,424 |
| 3. Industry | | | |
| Industrial customers | 388 | 492 | 661 |
| Unit water consumption (m3/day) | 2.1 | 2.1 | 2.1 |
| Industrial water requirement (m3/day) | 814 | 1,031 | 1,385 |
| 4. Public Faucet | | | |
| Points | 32 | - | - |
| Unit water consumption (Lcd) | 30 | 30 | 30 |
| Population served | 10,310 | - | - |
| Water requirement (m3/day) | 309 | - | - |
| 5. Washing Station | | | |
| Points | 10 | 10 | 10 |
| Unit water consumption (m3/day) | 30 | 30 | 30 |
| Water requirement (m3/day) | 300 | 300 | 300 |
| 6. Public Institutions, Government Offices, etc. | | | |
| Water requirement (m3/day) | 672 | 1,015 | 1,587 |
| 7. Subtotal of 1 + 2 + 3 + 4 + 5 + 6 | 17,676 | 25,352 | 38,445 |
| Unaccounted-for water ratio (%) | 40 | 30 | 20 |
| Unaccounted-for water | 11,784 | 10,865 | 9,611 |
| 8. Average Daily Water Demand | 29,459 | 36,216 | 48,056 |
| Ratio(Max/Ave) | 1.20 | 1.20 | 1.20 |
| 9. Maximum Daily Water Consumption | 35,351 | 43,460 | 57,668 |
| Maximum Daily Water Demand (L/sec) | 409.2 | 503.0 | 667.4 |
| Peak factor = 1.44 | | | |
| Hourly Maximum Water Demand (L/sec) | 589.2 | 724.3 | 961.1 |

Population served by private wells = 4000 in 2000, 2000 in 2008
 Illegal connections = 2500 x 6 = 15000 in 2000, 5000 in 2008

| | | | |
|---|------|------|------|
| Population served by House connections/population | 0.75 | 0.85 | 0.95 |
| | 54 | 200 | 500 |

Water consumption per house = Unit water consumption x 5.37 members per house
 5.37

| | |
|------|------------------------------|
| 1.03 | =growth rate |
| 1.00 | =multiplier(actual/contract) |

| | |
|------|------------------------------|
| 1.03 | =growth rate |
| 1.00 | =multiplier(actual/contract) |

by 2005, EMAX is planning to eliminate the public faucets

| | |
|----|--------------------------|
| 30 | lpcd |
| 60 | houses per public faucet |

| | | |
|----|--------|------------------------|
| 30 | m3/day | average 10-hour supply |
|----|--------|------------------------|

| | | | |
|---|-------|-------|-------|
| 5 | 2000 | 2008 | 2018 |
| | 3,375 | 2,897 | 961 |
| | 5,892 | 6,157 | 7,208 |
| | 2,517 | 1,811 | 1,442 |

5% of Domestic
 Illegal connections (12%, 8%, 2%)
 (20%, 17%, 15%) leakage
 8% other losses in 2000

| | House Con. | Public Faucet | Washing Station | Commercial | Industrial | Total | Illegal Con. | Connections |
|--------------|---------------|---------------|-----------------|--------------|------------|---------------|--------------|---------------|
| Zone 1 | 6,208 | 20 | 2 | 621 | 130 | 6,961 | 856 | |
| 2 | 724 | | 3 | 143 | 64 | 921 | 89 | |
| 3 | 4,223 | 12 | | 526 | 94 | 4,853 | 287 | Total 1 - 4 |
| 4 | 591 | | | 6 | 5 | 600 | - | 13,335 |
| 5 | 1,304 | | | 61 | 41 | 1,426 | 414 | |
| 6 | 552 | | 1 | 5 | 4 | 560 | 82 | |
| 7 | 1,192 | | | 12 | 7 | 1,209 | 160 | |
| 8 | 979 | | 1 | 13 | 23 | 1,052 | 205 | |
| 9 | 819 | | 2 | 11 | 9 | 838 | 140 | |
| 10 | 789 | | 1 | 15 | 11 | 789 | 82 | Total 5 - 9 |
| 11 | 9 | | | - | - | 9 | - | 5,883 |
| Total | 17,390 | 32 | 10 | 1,413 | 388 | 19,218 | 2,315 | 19,218 |

Total figures do not comply the numbers because some connections are not categorized.

| | |
|-------------------|---------------|
| Media | 10,377 |
| Baja | 6,116 |
| Alta | 1,155 |
| Alta_1 | 370 |
| Rosario Bajo | 1,088 |
| Baul | 112 |
| Sumatorias | 19,218 |

Public faucets are usually installed at every public market.

| | Alta | Alta 1 | Baja | Media | Baul | Total |
|--------------|----------|----------|----------|----------|----------|-----------|
| Zone 1 | | | | | | |
| 2 | | | | | | |
| 3 | | | | | | |
| 4 | | | | | | |
| 5 | | | | | | |
| 6 | | | | | | |
| 7 | | | | | | |
| 8 | | | | | | |
| 9 | 1 | | | | | |
| 10 | | | | | | |
| 11 | | | | | | |
| Total | 0 | 1 | 0 | 5 | 4 | 10 |

Washing Station

Hourly Maximum Demand (L/sec)
2000 Hourly Maximum

| | Rosario | | | Pressure Zone | | | Total |
|--------|---------|------|--------|---------------|-------|------|-------|
| | Bajo | Alta | Alta 1 | Baja | Media | Baul | |
| Zone 1 | - | - | - | 111.3 | 109.8 | - | 221.1 |
| 2 | 29.7 | - | - | 1.8 | - | - | 31.5 |
| 3 | - | - | - | 19.5 | 116.8 | - | 136.2 |
| 4 | - | - | - | 10.1 | 4.2 | 1.1 | 15.5 |
| 5 | - | - | - | 40.8 | 0.5 | 1.6 | 42.9 |
| 6 | - | - | - | 7.8 | 10.5 | - | 18.3 |
| 7 | - | - | - | 7.0 | 34.6 | - | 41.6 |
| 8 | - | 12.4 | 0.2 | 0.4 | 16.5 | - | 29.5 |
| 9 | - | 11.3 | 8.2 | - | 6.3 | - | 25.8 |
| 10 | - | 7.4 | - | - | 13.2 | - | 20.6 |
| 11 | - | - | - | 0.5 | - | - | 0.5 |
| Total | 29.7 | 31.0 | 8.4 | 199.2 | 312.4 | 2.7 | 583.4 |

Maximum Daily Demand (m3/day)
2000 Maximum

| | Rosario | | | Pressure Zone | | | Total |
|--------|---------|-------|--------|---------------|--------|------|--------|
| | Bajo | Alta | Alta 1 | Baja | Media | Baul | |
| Zone 1 | - | - | - | 6,680 | 6,586 | - | 13,267 |
| 2 | 1,781 | - | - | 108 | - | - | 1,889 |
| 3 | - | - | - | 1,168 | 7,006 | - | 8,174 |
| 4 | - | - | - | 607 | 253 | 67 | 927 |
| 5 | - | - | - | 2,447 | 31 | 93 | 2,571 |
| 6 | - | - | - | 468 | 631 | - | 1,099 |
| 7 | - | - | - | 420 | 2,076 | - | 2,497 |
| 8 | - | 743 | 9 | 24 | 992 | - | 1,769 |
| 9 | - | 675 | 493 | - | 379 | - | 1,547 |
| 10 | - | 443 | - | - | 792 | - | 1,235 |
| 11 | - | - | - | 32 | - | - | 32 |
| Total | 1,781 | 1,861 | 502 | 11,953 | 18,747 | 161 | 35,006 |

2008 Hourly Maximum

| | Rosario | | | Pressure Zone | | | Total |
|--------|---------|------|--------|---------------|-------|------|-------|
| | Bajo | Alta | Alta 1 | Baja | Media | Baul | |
| Zone 1 | - | - | - | 122.8 | 121.0 | - | 243.8 |
| 2 | 34.3 | - | - | 1.8 | - | - | 36.1 |
| 3 | - | - | - | 22.0 | 131.8 | - | 153.8 |
| 4 | - | - | - | 12.0 | 5.0 | 1.3 | 18.3 |
| 5 | - | - | - | 59.9 | 0.8 | 2.3 | 62.9 |
| 6 | - | - | - | 11.9 | 16.5 | - | 28.4 |
| 7 | - | - | - | 10.2 | 50.5 | - | 60.7 |
| 8 | - | 18.8 | 0.2 | 0.6 | 24.9 | - | 44.5 |
| 9 | - | 17.1 | 12.7 | - | 9.4 | - | 39.2 |
| 10 | - | 11.6 | - | - | 20.5 | - | 32.1 |
| 11 | - | - | - | 4.3 | - | - | 4.3 |
| Total | 34.3 | 47.6 | 13.0 | 245.5 | 380.4 | 3.6 | 724.3 |

2008 Maximum

| | Rosario | | | Pressure Zone | | | Total |
|--------|---------|-------|--------|---------------|--------|------|--------|
| | Bajo | Alta | Alta 1 | Baja | Media | Baul | |
| Zone 1 | - | - | - | 7,366 | 7,262 | - | 14,627 |
| 2 | 2,060 | - | - | 108 | - | - | 2,168 |
| 3 | - | - | - | 1,318 | 7,910 | - | 9,228 |
| 4 | - | - | - | 719 | 300 | 80 | 1,099 |
| 5 | - | - | - | 3,593 | 46 | 137 | 3,776 |
| 6 | - | - | - | 714 | 991 | - | 1,705 |
| 7 | - | - | - | 613 | 3,029 | - | 3,642 |
| 8 | - | 1,131 | 14 | 36 | 1,491 | - | 2,672 |
| 9 | - | 1,025 | 763 | - | 566 | - | 2,355 |
| 10 | - | 698 | - | - | 1,229 | - | 1,927 |
| 11 | - | - | - | 260 | - | - | 260 |
| Total | 2,060 | 2,854 | 777 | 14,727 | 22,824 | 217 | 43,460 |

2018 Hourly Maximum

| | Rosario | | | Pressure Zone | | | Total |
|--------|---------|------|--------|---------------|-------|------|-------|
| | Bajo | Alta | Alta 1 | Baja | Media | Baul | |
| Zone 1 | - | - | - | 150.0 | 147.9 | - | 297.8 |
| 2 | 44.1 | - | - | 1.8 | - | - | 45.9 |
| 3 | - | - | - | 28.6 | 171.6 | - | 200.2 |
| 4 | - | - | - | 16.4 | 6.8 | 1.8 | 25.1 |
| 5 | - | - | - | 82.7 | 1.1 | 3.2 | 86.9 |
| 6 | - | - | - | 17.6 | 24.9 | - | 42.5 |
| 7 | - | - | - | 13.8 | 68.2 | - | 82.0 |
| 8 | - | 27.0 | 0.3 | 0.9 | 35.3 | - | 63.5 |
| 9 | - | 24.8 | 18.7 | - | 13.6 | - | 57.1 |
| 10 | - | 16.9 | - | - | 30.5 | - | 47.3 |
| 11 | - | - | - | 12.9 | - | - | 12.9 |
| Total | 44.1 | 68.7 | 19.0 | 324.6 | 499.7 | 5.0 | 961.1 |

2018 Maximum

| | Rosario | | | Pressure Zone | | | Total |
|--------|---------|-------|--------|---------------|--------|------|--------|
| | Bajo | Alta | Alta 1 | Baja | Media | Baul | |
| Zone 1 | - | - | - | 8,999 | 8,872 | - | 17,871 |
| 2 | 2,648 | - | - | 108 | - | - | 2,756 |
| 3 | - | - | - | 1,716 | 10,294 | - | 12,009 |
| 4 | - | - | - | 984 | 410 | 109 | 1,504 |
| 5 | - | - | - | 4,960 | 63 | 189 | 5,212 |
| 6 | - | - | - | 1,056 | 1,491 | - | 2,548 |
| 7 | - | - | - | 829 | 4,093 | - | 4,922 |
| 8 | - | 1,619 | 21 | 52 | 2,119 | - | 3,809 |
| 9 | - | 1,490 | 1,121 | - | 816 | - | 3,426 |
| 10 | - | 1,011 | - | - | 1,827 | - | 2,838 |
| 11 | - | - | - | 772 | - | - | 772 |
| Total | 2,648 | 4,120 | 1,142 | 19,476 | 29,984 | 298 | 57,667 |

Breakdown Water Requirement

1. Domestic

2000 Domestic Water Requirement by Administrative and Pressure Zone

| Zone | Rosario | | | Pressure Zone | | | Total |
|--------------|------------|------------|------------|---------------|--------------|-----------|---------------|
| | Bajo | Alta | Alta 1 | Baja | Media | Baul | |
| 1 | - | - | - | - | 2,292 | 2,260 | - |
| 2 | 495 | - | - | - | - | - | 495 |
| 3 | - | - | - | - | 375 | 2,250 | - |
| 4 | - | - | - | - | 276 | 115 | 31 |
| 5 | - | - | - | - | 919 | 12 | 35 |
| 6 | - | - | - | - | 338 | - | 570 |
| 7 | - | - | - | - | 250 | 1,234 | - |
| 8 | - | 316 | 4 | - | 10 | 406 | - |
| 9 | - | 301 | 232 | - | - | 161 | - |
| 10 | - | 225 | - | - | - | 384 | - |
| 11 | - | - | - | - | 7 | - | - |
| Total | 495 | 841 | 236 | 4,360 | 7,161 | 66 | 13,159 |

2008 Domestic Water Requirement by Administrative and Pressure Zone

| Zone | Rosario | | | Pressure Zone | | | Total |
|--------------|------------|--------------|------------|---------------|---------------|------------|---------------|
| | Bajo | Alta | Alta 1 | Baja | Media | Baul | |
| 1 | - | - | - | - | 3,258 | 3,212 | - |
| 2 | 746 | - | - | - | - | - | 746 |
| 3 | - | - | - | - | 560 | 3,360 | - |
| 4 | - | - | - | - | 406 | 169 | 45 |
| 5 | - | - | - | - | 1,629 | 21 | 62 |
| 6 | - | - | - | - | 390 | 569 | - |
| 7 | - | - | - | - | 373 | 1,843 | - |
| 8 | - | 545 | 7 | - | 17 | 701 | - |
| 9 | - | 512 | 394 | - | 274 | - | - |
| 10 | - | 378 | - | - | - | 646 | - |
| 11 | - | - | - | - | 186 | - | - |
| Total | 746 | 1,435 | 401 | 6,819 | 10,795 | 107 | 20,303 |

2018 Domestic Water Requirement by Administrative and Pressure Zone

| Zone | Rosario | | | Pressure Zone | | | Total |
|--------------|--------------|--------------|------------|---------------|---------------|------------|---------------|
| | Bajo | Alta | Alta 1 | Baja | Media | Baul | |
| 1 | - | - | - | - | 4,522 | - | - |
| 2 | 1,127 | - | - | - | - | - | 1,127 |
| 3 | - | - | - | - | 838 | 5,031 | - |
| 4 | - | - | - | - | 599 | 250 | 67 |
| 5 | - | - | - | - | 2,930 | 37 | 112 |
| 6 | - | - | - | - | 674 | 986 | - |
| 7 | - | - | - | - | 559 | 2,759 | - |
| 8 | - | 962 | 12 | - | 31 | 1,237 | - |
| 9 | - | 893 | 688 | - | - | 479 | - |
| 10 | - | 653 | - | - | - | 1,117 | - |
| 11 | - | - | - | - | 599 | - | - |
| Total | 1,127 | 2,508 | 701 | 10,818 | 16,417 | 178 | 31,749 |

Average Daily Demand (m3/day)

2000 Average

| Zone | Rosario | | | Pressure Zone | | | Total |
|--------------|--------------|--------------|------------|---------------|---------------|------------|---------------|
| | Bajo | Alta | Alta 1 | Baja | Media | Baul | |
| 1 | - | - | - | 5,567 | 5,489 | - | 11,055 |
| 2 | 1,484 | - | - | 90 | - | - | 1,574 |
| 3 | - | - | - | 973 | 5,838 | - | 6,811 |
| 4 | - | - | - | 506 | 211 | 56 | 773 |
| 5 | - | - | - | 2,039 | 26 | 78 | 2,143 |
| 6 | - | - | - | 390 | 526 | - | 916 |
| 7 | - | - | - | 350 | 1,730 | - | 2,080 |
| 8 | - | 619 | 8 | 20 | 827 | - | 1,474 |
| 9 | - | 563 | 411 | - | 316 | - | 1,289 |
| 10 | - | 369 | - | - | 660 | - | 1,029 |
| 11 | - | - | - | 26 | - | - | 26 |
| Total | 1,484 | 1,551 | 419 | 9,961 | 15,622 | 134 | 29,171 |

2008 Average

| Zone | Rosario | | | Pressure Zone | | | Total |
|--------------|--------------|--------------|------------|---------------|---------------|------------|---------------|
| | Bajo | Alta | Alta 1 | Baja | Media | Baul | |
| 1 | - | - | - | 6,138 | 6,052 | - | 12,189 |
| 2 | 1,717 | - | - | 90 | - | - | 1,807 |
| 3 | - | - | - | 1,099 | 6,592 | - | 7,690 |
| 4 | - | - | - | 599 | 250 | 67 | 915 |
| 5 | - | - | - | 2,994 | 38 | 114 | 3,146 |
| 6 | - | - | - | 595 | 826 | - | 1,421 |
| 7 | - | - | - | 511 | 2,524 | - | 3,035 |
| 8 | - | 942 | 12 | 30 | 1,243 | - | 2,227 |
| 9 | - | 854 | 636 | - | 472 | - | 1,962 |
| 10 | - | 582 | - | - | 1,024 | - | 1,606 |
| 11 | - | - | - | 216 | - | - | 216 |
| Total | 1,717 | 2,379 | 648 | 12,273 | 19,020 | 181 | 36,216 |

2018 Average

| Zone | Rosario | | | Pressure Zone | | | Total |
|--------------|--------------|--------------|------------|---------------|---------------|------------|---------------|
| | Bajo | Alta | Alta 1 | Baja | Media | Baul | |
| 1 | - | - | - | 7,499 | 7,393 | - | 14,892 |
| 2 | 2,206 | - | - | 90 | - | - | 2,296 |
| 3 | - | - | - | 1,430 | 8,578 | - | 10,008 |
| 4 | - | - | - | 820 | 342 | 91 | 1,253 |
| 5 | - | - | - | 4,133 | 53 | 158 | 4,343 |
| 6 | - | - | - | 880 | 1,243 | - | 2,123 |
| 7 | - | - | - | 691 | 3,411 | - | 4,102 |
| 8 | - | 1,349 | 17 | 43 | 1,765 | - | 3,175 |
| 9 | - | 1,242 | 934 | - | 680 | - | 2,855 |
| 10 | - | 862 | - | - | 1,503 | - | 2,365 |
| 11 | - | - | - | 644 | - | - | 644 |
| Total | 2,206 | 3,453 | 951 | 16,230 | 24,968 | 249 | 48,056 |

2. Commercial

2000 Commercial Water Requirement by Administrative and Pressure Zone

| | Pressure Zone | | | Total |
|--------------|---------------|-----------|------------|--------------|
| | Rosario Bajo | Alta | Baja | |
| Zone 1 | - | - | 472 | 465 |
| 2 | 216 | - | - | 216 |
| 3 | - | - | 113 | 681 |
| 4 | - | - | 6 | 2 |
| 5 | - | - | 88 | 1 |
| 6 | - | - | 3 | 4 |
| 7 | - | - | 3 | 15 |
| 8 | - | 8 | 0 | 11 |
| 9 | - | 7 | 6 | 4 |
| 10 | - | 8 | - | 14 |
| 11 | - | - | - | - |
| Total | 216 | 24 | 686 | 1,198 |

3. Industrial

2000 Industrial Water Requirement by Administrative and Pressure Zone

| | Pressure Zone | | | Total |
|--------------|---------------|-----------|------------|------------|
| | Rosario Bajo | Alta | Baja | |
| Zone 1 | - | - | 137 | 135 |
| 2 | 134 | - | - | - |
| 3 | - | - | 28 | 169 |
| 4 | - | - | 7 | 3 |
| 5 | - | - | 82 | 1 |
| 6 | - | - | 3 | 5 |
| 7 | - | - | 2 | 12 |
| 8 | - | 21 | 0 | 1 |
| 9 | - | 8 | 6 | 4 |
| 10 | - | 9 | - | 15 |
| 11 | - | - | - | - |
| Total | 134 | 37 | 261 | 371 |

2008 Commercial Water Requirement by Administrative and Pressure Zone

| | Pressure Zone | | | Total |
|--------------|---------------|-----------|------------|--------------|
| | Rosario Bajo | Alta | Baja | |
| Zone 1 | - | - | 598 | 590 |
| 2 | 274 | - | - | 274 |
| 3 | - | - | 144 | 862 |
| 4 | - | - | 8 | 3 |
| 5 | - | - | 111 | 1 |
| 6 | - | - | 4 | 6 |
| 7 | - | - | 4 | 19 |
| 8 | - | 11 | 0 | 14 |
| 9 | - | 9 | 7 | 5 |
| 10 | - | 11 | - | 18 |
| 11 | - | - | - | - |
| Total | 274 | 30 | 888 | 1,518 |

2008 Industrial Water Requirement by Administrative and Pressure Zone

| | Pressure Zone | | | Total |
|--------------|---------------|-----------|------------|------------|
| | Rosario Bajo | Alta | Baja | |
| Zone 1 | - | - | 174 | 171 |
| 2 | 170 | - | - | - |
| 3 | - | - | 36 | 214 |
| 4 | - | - | 9 | 4 |
| 5 | - | - | 104 | 1 |
| 6 | - | - | 4 | 6 |
| 7 | - | - | 3 | 15 |
| 8 | - | 26 | 0 | 1 |
| 9 | - | 10 | 8 | 6 |
| 10 | - | 11 | - | 18 |
| 11 | - | - | - | - |
| Total | 170 | 47 | 330 | 470 |

2018 Commercial Water Requirement by Administrative and Pressure Zone

| | Pressure Zone | | | Total |
|--------------|---------------|-----------|--------------|--------------|
| | Rosario Bajo | Alta | Baja | |
| Zone 1 | - | - | 758 | 747 |
| 2 | 346 | - | - | - |
| 3 | - | - | 182 | 1,092 |
| 4 | - | - | 10 | 4 |
| 5 | - | - | 141 | 2 |
| 6 | - | - | 5 | 7 |
| 7 | - | - | 5 | 24 |
| 8 | - | 14 | 0 | 17 |
| 9 | - | 12 | 9 | 6 |
| 10 | - | 13 | - | 23 |
| 11 | - | - | - | - |
| Total | 346 | 38 | 1,100 | 1,923 |

2018 Industrial Water Requirement by Administrative and Pressure Zone

| | Pressure Zone | | | Total |
|--------------|---------------|-----------|------------|------------|
| | Rosario Bajo | Alta | Baja | |
| Zone 1 | - | - | 234 | 230 |
| 2 | 228 | - | - | - |
| 3 | - | - | 48 | 288 |
| 4 | - | - | 12 | 5 |
| 5 | - | - | 139 | 2 |
| 6 | - | - | 6 | 8 |
| 7 | - | - | 4 | 21 |
| 8 | - | 35 | 0 | 1 |
| 9 | - | 14 | 11 | 7 |
| 10 | - | 14 | - | 25 |
| 11 | - | - | - | - |
| Total | 228 | 64 | 444 | 631 |

4. Public Faucets

2000 Public Faucet Water Requirement by Administrative and Pressure Zone

| | Pressure Zone | | | Total |
|--------|---------------|------|------|-------|
| | Rosario Bajo | Alta | Baja | |
| Zone 1 | - | - | 97 | 96 |
| 2 | - | - | - | - |
| 3 | - | - | 17 | 99 |
| 4 | - | - | - | - |
| 5 | - | - | - | - |
| 6 | - | - | - | - |
| 7 | - | - | - | - |
| 8 | - | - | - | - |
| 9 | - | - | - | - |
| 10 | - | - | - | - |
| 11 | - | - | - | - |
| Total | - | - | 114 | 195 |
| | | | | 309 |

5. Washing Station

2000 Washing Station Water Requirement by Administrative and Pressure Zone

| | Pressure Zone | | | Total |
|--------|---------------|------|------|-------|
| | Rosario Bajo | Alta | Baja | |
| Zone 1 | - | - | 30 | 30 |
| 2 | - | - | 90 | 90 |
| 3 | - | - | - | - |
| 4 | - | - | - | - |
| 5 | - | - | - | - |
| 6 | - | - | 30 | 30 |
| 7 | - | - | - | - |
| 8 | - | - | - | 30 |
| 9 | - | 30 | - | 30 |
| 10 | - | - | - | 30 |
| 11 | - | - | - | - |
| Total | - | 30 | 150 | 120 |
| | | | | 300 |

2008 Public Faucet Water Requirement by Administrative and Pressure Zone

| | Pressure Zone | | | Total |
|--------|---------------|------|------|-------|
| | Rosario Bajo | Alta | Baja | |
| Zone 1 | - | - | - | - |
| 2 | - | - | - | - |
| 3 | - | - | - | - |
| 4 | - | - | - | - |
| 5 | - | - | - | - |
| 6 | - | - | - | - |
| 7 | - | - | - | - |
| 8 | - | - | - | - |
| 9 | - | - | - | - |
| 10 | - | - | - | - |
| 11 | - | - | - | - |
| Total | - | - | - | - |

2008 Washing Station Water Requirement by Administrative and Pressure Zone

| | Pressure Zone | | | Total |
|--------|---------------|------|------|-------|
| | Rosario Bajo | Alta | Baja | |
| Zone 1 | - | - | 30 | 30 |
| 2 | - | - | 90 | 90 |
| 3 | - | - | - | - |
| 4 | - | - | - | - |
| 5 | - | - | - | - |
| 6 | - | - | 30 | 30 |
| 7 | - | - | - | - |
| 8 | - | - | - | 30 |
| 9 | - | 30 | - | 30 |
| 10 | - | - | - | 30 |
| 11 | - | - | - | - |
| Total | - | 30 | 150 | 120 |
| | | | | 300 |

2018 Public Faucet Water Requirement by Administrative and Pressure Zone

| | Pressure Zone | | | Total |
|--------|---------------|------|------|-------|
| | Rosario Bajo | Alta | Baja | |
| Zone 1 | - | - | - | - |
| 2 | - | - | - | - |
| 3 | - | - | - | - |
| 4 | - | - | - | - |
| 5 | - | - | - | - |
| 6 | - | - | - | - |
| 7 | - | - | - | - |
| 8 | - | - | - | - |
| 9 | - | - | - | - |
| 10 | - | - | - | - |
| 11 | - | - | - | - |
| Total | - | - | - | - |

2018 Washing Station Water Requirement by Administrative and Pressure Zone

| | Pressure Zone | | | Total |
|--------|---------------|------|------|-------|
| | Rosario Bajo | Alta | Baja | |
| Zone 1 | - | - | 30 | 30 |
| 2 | - | - | 90 | 90 |
| 3 | - | - | - | - |
| 4 | - | - | - | - |
| 5 | - | - | - | - |
| 6 | - | - | 30 | 30 |
| 7 | - | - | - | - |
| 8 | - | - | - | 30 |
| 9 | - | 30 | - | 30 |
| 10 | - | - | - | 30 |
| 11 | - | - | - | - |
| Total | - | 30 | 150 | 120 |
| | | | | 300 |

6. Public Institutions, Government Offices, etc

2000 Institution Water Requirement by Administrative and Pressure Zone

| | Pressure Zone | | | | | | Total |
|--------------|---------------|------------|-----------|------------|------------|----------|------------|
| | Rosario Bajo | Alta | Alta 1 | Baja | Media | Baul | |
| Zone 1 | - | - | - | 57 | 56 | - | 112 |
| 2 | 22 | - | - | - | - | - | 22 |
| 3 | - | - | - | 14 | 82 | - | 95 |
| 4 | - | - | - | 10 | 4 | 1 | 15 |
| 5 | - | - | - | 63 | 1 | 2 | 66 |
| 6 | - | - | - | 21 | 30 | - | 51 |
| 7 | - | - | - | 9 | 42 | - | 51 |
| 8 | - | 42 | 1 | 1 | 54 | - | 98 |
| 9 | - | 44 | 34 | - | 24 | - | 102 |
| 10 | - | 16 | - | - | 27 | - | 43 |
| 11 | - | - | - | 17 | - | - | 17 |
| Total | 22 | 102 | 35 | 191 | 319 | 3 | 672 |

2008 Institution Water Requirement by Administrative and Pressure Zone

| | Pressure Zone | | | | | | Total |
|--------------|---------------|------------|-----------|------------|------------|----------|--------------|
| | Rosario Bajo | Alta | Alta 1 | Baja | Media | Baul | |
| Zone 1 | - | - | - | 85 | 84 | - | 170 |
| 2 | 34 | - | - | - | - | - | 34 |
| 3 | - | - | - | 21 | 123 | - | 144 |
| 4 | - | - | - | 14 | 6 | 2 | 22 |
| 5 | - | - | - | 95 | 1 | 4 | 100 |
| 6 | - | - | - | 31 | 46 | - | 77 |
| 7 | - | - | - | 13 | 64 | - | 77 |
| 8 | - | 63 | 1 | 2 | 81 | - | 147 |
| 9 | - | 67 | 52 | - | 36 | - | 154 |
| 10 | - | 24 | - | - | 41 | - | 64 |
| 11 | - | - | - | 26 | - | - | 26 |
| Total | 34 | 154 | 52 | 288 | 482 | 5 | 1,015 |

2018 Institution Water Requirement by Administrative and Pressure Zone

| | Pressure Zone | | | | | | Total |
|--------------|---------------|------------|-----------|------------|------------|----------|--------------|
| | Rosario Bajo | Alta | Alta 1 | Baja | Media | Baul | |
| Zone 1 | - | - | - | 134 | 132 | - | 265 |
| 2 | 53 | - | - | - | - | - | 53 |
| 3 | - | - | - | 32 | 193 | - | 225 |
| 4 | - | - | - | 23 | 9 | 3 | 35 |
| 5 | - | - | - | 149 | 2 | 6 | 156 |
| 6 | - | - | - | 49 | 72 | - | 121 |
| 7 | - | - | - | 20 | 100 | - | 120 |
| 8 | - | 99 | 1 | 3 | 127 | - | 231 |
| 9 | - | 105 | 81 | - | 56 | - | 241 |
| 10 | - | 37 | - | - | 63 | - | 100 |
| 11 | - | - | - | 41 | - | - | 41 |
| Total | 53 | 241 | 82 | 450 | 754 | 8 | 1,587 |

7-1. Unaccounted-for Water by Illegal Connections

2000 Illegal Connection Water Abuse, by Administrative and Pressure Zone

| | Pressure Zone | | | | | | Total |
|--------------|---------------|------------|-----------|--------------|--------------|-----------|--------------|
| | Rosario Bajo | Alta | Alta 1 | Baja | Media | Baul | |
| Zone 1 | - | - | - | 628 | 620 | - | 1,248 |
| 2 | 130 | - | - | - | - | - | 130 |
| 3 | - | - | - | 60 | 359 | - | 418 |
| 4 | - | - | - | - | - | - | - |
| 5 | - | - | - | 574 | 7 | 22 | 604 |
| 6 | - | - | - | 49 | 71 | - | 120 |
| 7 | - | - | - | 39 | 194 | - | 233 |
| 8 | - | 128 | 2 | 4 | 165 | - | 299 |
| 9 | - | 88 | 68 | - | 47 | - | 204 |
| 10 | - | 44 | - | - | 75 | - | 120 |
| 11 | - | - | - | - | - | - | - |
| Total | 130 | 261 | 70 | 1,354 | 1,538 | 22 | 3,375 |

2008 Illegal Connection Water Abuse, by Administrative and Pressure Zone

| | Pressure Zone | | | | | | Total |
|--------------|---------------|------------|-----------|--------------|--------------|-----------|--------------|
| | Rosario Bajo | Alta | Alta 1 | Baja | Media | Baul | |
| Zone 1 | - | - | - | 539 | 532 | - | 1,071 |
| 2 | 111 | - | - | - | - | - | 111 |
| 3 | - | - | - | 51 | 308 | - | 359 |
| 4 | - | - | - | - | - | - | - |
| 5 | - | - | - | 493 | 6 | 19 | 518 |
| 6 | - | - | - | 42 | 61 | - | 103 |
| 7 | - | - | - | 34 | 167 | - | 200 |
| 8 | - | 110 | 1 | 4 | 142 | - | 257 |
| 9 | - | 76 | 59 | - | 41 | - | 175 |
| 10 | - | 38 | - | - | 65 | - | 103 |
| 11 | - | - | - | - | - | - | - |
| Total | 111 | 224 | 60 | 1,163 | 1,321 | 19 | 2,897 |

2018 Illegal Connection Water Abuse, by Administrative and Pressure Zone

| | Pressure Zone | | | | | | Total |
|--------------|---------------|-----------|-----------|------------|------------|----------|------------|
| | Rosario Bajo | Alta | Alta 1 | Baja | Media | Baul | |
| Zone 1 | - | - | - | 179 | 176 | - | 355 |
| 2 | 37 | - | - | - | - | - | 37 |
| 3 | - | - | - | 17 | 102 | - | 119 |
| 4 | - | - | - | - | - | - | - |
| 5 | - | - | - | 164 | 2 | 6 | 172 |
| 6 | - | - | - | 14 | 20 | - | 34 |
| 7 | - | - | - | 11 | 55 | - | 66 |
| 8 | - | 37 | 0 | 1 | 47 | - | 85 |
| 9 | - | 25 | 19 | - | 14 | - | 58 |
| 10 | - | 13 | - | - | 21 | - | 34 |
| 11 | - | - | - | - | - | - | - |
| Total | 37 | 74 | 20 | 386 | 438 | 6 | 961 |

7-2. Unaccounted-for Water by Leakage and Other Losses:
 2000 Leakage and Other Water Losses by Administrative and Pressure Zone

| | Pressure Zone | | | | | Total | |
|--------------|---------------|------------|-----------|--------------|--------------|-----------|--------------|
| | Rosario Bajo | Alta | Alta 1 | Baja | Media | | Baul |
| Zone 1 | - | - | - | 1,853 | 1,827 | - | 3,680 |
| 2 | 487 | - | - | - | - | - | 487 |
| 3 | - | - | - | 366 | 2,199 | - | 2,565 |
| 4 | - | - | - | 208 | 87 | 23 | 317 |
| 5 | - | - | - | 314 | 4 | 12 | 330 |
| 6 | - | - | - | 53 | 77 | - | 129 |
| 7 | - | - | - | 47 | 232 | - | 279 |
| 8 | - | 104 | 1 | 3 | 134 | - | 243 |
| 9 | - | 84 | 65 | - | 45 | - | 194 |
| 10 | - | 67 | - | - | 115 | - | 182 |
| 11 | - | - | - | 2 | - | - | 2 |
| Total | 487 | 256 | 66 | 2,846 | 4,720 | 35 | 8,409 |

2008 Leakage and Other Water Losses by Administrative and Pressure Zone

| | Pressure Zone | | | | | Total | |
|--------------|---------------|------------|------------|--------------|--------------|-----------|--------------|
| | Rosario Bajo | Alta | Alta 1 | Baja | Media | | Baul |
| Zone 1 | - | - | - | 1,453 | 1,433 | - | 2,886 |
| 2 | 382 | - | - | - | - | - | 382 |
| 3 | - | - | - | 287 | 1,725 | - | 2,012 |
| 4 | - | - | - | 163 | 68 | 18 | 249 |
| 5 | - | - | - | 563 | 7 | 21 | 591 |
| 6 | - | - | - | 94 | 138 | - | 232 |
| 7 | - | - | - | 84 | 417 | - | 501 |
| 8 | - | 187 | 2 | 6 | 241 | - | 436 |
| 9 | - | 151 | 116 | - | 81 | - | 347 |
| 10 | - | 121 | - | - | 206 | - | 327 |
| 11 | - | - | - | 4 | - | - | 4 |
| Total | 382 | 458 | 118 | 2,655 | 4,315 | 40 | 7,968 |

2018 Leakage and Other Water Losses by Administrative and Pressure Zone

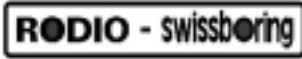
| | Pressure Zone | | | | | Total | |
|--------------|---------------|------------|------------|--------------|--------------|-----------|--------------|
| | Rosario Bajo | Alta | Alta 1 | Baja | Media | | Baul |
| Zone 1 | - | - | - | 1,578 | 1,555 | - | 3,133 |
| 2 | 415 | - | - | - | - | - | 415 |
| 3 | - | - | - | 312 | 1,872 | - | 2,184 |
| 4 | - | - | - | 177 | 74 | 20 | 270 |
| 5 | - | - | - | 611 | 8 | 23 | 642 |
| 6 | - | - | - | 102 | 150 | - | 252 |
| 7 | - | - | - | 92 | 453 | - | 544 |
| 8 | - | 203 | 3 | 6 | 261 | - | 474 |
| 9 | - | 163 | 126 | - | 88 | - | 377 |
| 10 | - | 131 | - | - | 224 | - | 355 |
| 11 | - | - | - | 4 | - | - | 4 |
| Total | 415 | 498 | 129 | 2,882 | 4,684 | 43 | 8,650 |

9.8 建設サイトの地質調査結果

ソナアルタ、ソナメディア、コロニアモリーナの配水池建設予定地3ヶ所において地質調査を現地再委託にて実施した結果は下記の通りである。サイトにおいてボーリングを実施し、1m毎に標準貫入試験と土質試験(単位体積重量試験、含水率試験、粒度試験、液性・塑性限界試験)を実施した。サイトでの標準的な土質は、砂質ローム、砂礫を含んだ火山灰、凝灰岩、軽石の風化土層から形成される。

標準貫入試験から推定される地盤地耐力は下表の通りである。地下水位はいずれのサイトにおいても調査の掘削深度20m以内では認められなかった。

| 深度 m | ソナアルタ | ソナメディア | コロニアモリーナ |
|------|-------|--------|----------|
| 1 | 6 | 5 | 4 |
| 2 | 7 | 12 | 5 |
| 3 | 17 | 7 | 15 |
| 4 | 19 | 15 | 26 |
| 5 | 21 | 18 | 22 |



LOG OF BORING

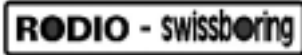
BOREHOLE ZONA ALTA

SHEET: 1/2

| | | |
|----------------------------------|---|---|
| CLIENT: KYOWA ENG. CONSU. | PROJECT: ABASTECIMIENTO DE AGUA POTABLE DEL AREA URBANA DEL MUNICIPIO DE QUETZALTENANGO, GUATEMALA | DRILL RIG: CME-55 |
| COUNTRY: GUATEMALA | | DRILLER: ERNESTO HERRERA |
| DEPTH: 20.45 m | COORDINATES: | DATE (STARTED-FINISHED): 20-21/01/04 |

| | | |
|----------------------|---|--|
| SOIL SAMPLING | BORING LOCATION: ZONA ALTA, QUETZALTENANGO | LOGGED BY: RODOLFO ALVARADO INSPECTOR: |
|----------------------|---|--|

| SAMPLE TYP | SAMPLE NUMBER | 1 SET 15 cm | 2 SET 30 cm | 3 SET 45 cm | N VALUE | Cm RECOVERED | DEPTH m | SAMPLE TYPE | GRAPHIC LOG | DESCRIPTION | SPT TEST | | | | | | |
|------------|---------------|-------------|-------------|-------------|---------|--------------|---------|-------------|-------------|--|----------|----|----|----|----|-----|----|
| | | | | | | | | | | | 10 | 20 | 30 | 40 | 50 | >50 | N |
| SPT | 1 | 2 | 1 | 1 | 2 | 40 | 0.00 | | | From 0.00 to 1.00m Residual soil; sandy silt, dark brown, very soft, moderate water content, low plasticity, with fine sand traces and organic contents. | ● | | | | | | 2 |
| SPT | 2 | 6 | 3 | 4 | 7 | 40 | 1.00 | | | From 1.00 to 3.50 m Tuff; highly weathered, silty sand; dark brown, with white grains, loose, and fine sand grains, low plasticity, low to moderate water content, with traces of medium sand and tuff clasts. | ● | | | | | | 7 |
| SPT | 3 | 2 | 3 | 4 | 7 | 45 | 2.00 | | | SPT 3; Idem material. | ● | | | | | | 7 |
| SH | 1 | | | | | 38 | 3.00 | | | Shelby Tube No.1. | | | | | | | |
| SPT | 4 | 7 | 6 | 7 | 13 | 45 | 3.50 | | | From 3.50 to 6.00 m Silty fine sand, yellowish, medium dense, dry to low water content, low plasticity, consists of tuff highly weathered to silty fine sand, fines of low plasticity with traces of medium sand. | ● | | | | | | 13 |
| SPT | 5 | 4 | 7 | 7 | 14 | 45 | 4.00 | | | SPT 5; Idem material. | ● | | | | | | 14 |
| SPT | 6 | 8 | 10 | 14 | 24 | 37 | 5.00 | | | From 6.00 to 9.00 m Silty fine sand; dark brown with black and orange clasts, medium dense, moderate water content, low plasticity. | ● | | | | | | 24 |
| SPT | 7 | 4 | 6 | 3 | 9 | 38 | 6.00 | | | SPT 7; Idem material; loose. | ● | | | | | | 9 |
| SPT | 8 | 6 | 7 | 9 | 16 | 35 | 7.00 | | | SPT 8; Idem material, medium dense. | ● | | | | | | 16 |
| SPT | 9 | 9 | 10 | 11 | 21 | 45 | 9.00 | | | From 9.00 to 12.60 Silty sand - sandy silt, dark brown-yellowish, medium dense, silt of low plasticity. | ● | | | | | | 21 |

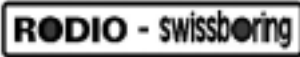


LOG OF BORING

BOREHOLE ZONA ALTA

SHEET: 2/2

| CLIENT: KYOWA ENG. CONSU. | | PROJECT: ABASTECIMIENTO DE AGUA POTABLE DEL AREA URBANA DEL MUNICIPIO DE QUETZALTENANGO, GUATEMALA | | | | DRILL RIG: CME-55 | | | | | | | | | | |
|---------------------------|---------------|--|-------------|-------------|---------|---|---------|-------------|-------------|---|----------|----|----|----|----|-----|
| COUNTRY: GUATEMALA | | COORDINATES: | | | | DRILLER: ERNESTO HERRERA | | | | | | | | | | |
| DEPTH: 20.45 m | | BORING LOCATION: ZONA ALTA, QUETZALTENANGO | | | | DATE (STARTED-FINISHED): 20-21/01/04 | | | | | | | | | | |
| SOIL SAMPLING | | BORING LOCATION: ZONA ALTA, QUETZALTENANGO | | | | LOGGED BY: RODOLFO ALVARADO INSPECTOR: | | | | | | | | | | |
| SAMPLE TYP | SAMPLE NUMBER | 1 SET 15 cm | 2 SET 30 cm | 3 SET 45 cm | N VALUE | Cm RECOVERED | DEPTH m | SAMPLE TYPE | GRAPHIC LOG | DESCRIPTION | SPT TEST | | | | | |
| | | | | | | | | | | | 10 | 20 | 30 | 40 | 50 | >50 |
| SPT | 10 | 5 | 6 | 9 | 15 | 35 | 10 | | | SPT 10; Idem material; medium dense, silty sand - sandy silt. | | | | | | 15 |
| SPT | 11 | 3 | 4 | 8 | 12 | 45 | 11 | | | SPT 11; Idem material, loose. | | | | | | 12 |
| SPT | 12 | 9 | 10 | 12 | 22 | 40 | 12 | | | SPT 12; Idem material, medium dense | | | | | | 22 |
| | | | | | | | 13 | | | From 12.60 to 13.00 m Sandy silt, yellowish brown, very stiff, moderate water content, low plasticity. | | | | | | |
| SPT | 13 | 7 | 10 | 15 | 25 | 45 | 13 | | | From 13.00 to 15.60 m Pumice sand, whitish, with dark brown grains, medium dense, medium to coarse grains, moderate water contents, no plastic. | | | | | | 25 |
| SPT | 14 | 10 | 18 | 19 | 37 | 45 | 14 | | | SPT 14; Idem material; silty fine sand, dense. | | | | | | 37 |
| SPT | 15 | 11 | 13 | 17 | 30 | 45 | 15 | | | SPT 15; Idem material, medium dense to dense. | | | | | | 30 |
| | | | | | | | 16 | | | From 15.60 to 17.60 m Fine sand with silt, ligh brown, with white grains, medium dense, with pumice grains from 1 to 2 cm in size, low water content, low to no plastic. | | | | | | 28 |
| SPT | 16 | 11 | 14 | 14 | 28 | 45 | 16 | | | SPT 16; Idem material. | | | | | | 28 |
| SPT | 17 | 8 | 11 | 16 | 27 | 45 | 17 | | | SPT 17; Idem material. | | | | | | 27 |
| | | | | | | | 18 | | | From 17.60 to 20.45 m Pumice, ligh gray to white, up to 3 cm in size, loose, soft, no plastic, very wet. | | | | | | 20 |
| SPT | 18 | 8 | 9 | 11 | 20 | 45 | 18 | | | SPT 18; Idem material, dense. | | | | | | 20 |
| SPT | 19 | 14 | 17 | 30 | 47 | 45 | 19 | | | SPT 19; Idem material, dense. | | | | | | 47 |
| SPT | 20 | 10 | 12 | 16 | 28 | 33 | 20 | | | SPT 20; Idem material, medium dense. | | | | | | 28 |
| 20.45 m END OF BORING | | | | | | | | | | | | | | | | |



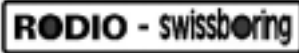
LOG OF BORING

BOREHOLE ZONA MEDIA

SHEET: 1/2

| | | |
|--|---|------------------------------------|
| CLIENT: KYOWA ENG. CONSU. | PROJECT: ABASTECIMIENTO DE AGUA POTABLE DEL AREA URBANA DEL MUNICIPIO DE QUETZALTENANGO, GUATEMALA | DRILL RIG: CME-55 |
| COUNTRY: GUATEMALA | | DRILLER: ERNESTO HERRERA |
| DEPTH: 20.45 m | COORDINATES: | DATE (STARTED-FINISHED): 22/01/04 |
| BORING LOCATION: ZONA MEDIA, QUETZALTENANGO | | LOGGED BY: RODOLFO ALVARADO |
| SOIL SAMPLING | | INSPECTOR: |

| SAMPLE TYP | SAMPLE NUMBER | 1 SET 15 cm | 2 SET 30 cm | 3 SET 45 cm | N VALUE | Cm RECOVERED | DEPTH m | SAMPLE TYPE | GRAPHIC LOG | DESCRIPTION | SPT TEST | | | | | | |
|------------|---------------|-------------|-------------|-------------|---------|--------------|---------|-------------|-------------|---|----------|----|----|----|----|-----|----|
| | | | | | | | | | | | 10 | 20 | 30 | 40 | 50 | >50 | N |
| SPT | 1 | 5 | 2 | 2 | 4 | 45 | 0.00 | | | From 0.00 to 0.45 m Residual soil; sandy silt, dark brown, soft to stiff, low water content, low plasticity, with roots. | ● | | | | | | 4 |
| SPT | 2 | 7 | 8 | 10 | 18 | 45 | 0.45 | | | From 0.45 to 3.60 m Silty sand - sandy silt, dark brown, stiff, low to moderate water content, fines with low to moderate plasticity. | | ● | | | | | 18 |
| SPT | 3 | 4 | 4 | 4 | 8 | 45 | 2.00 | | | Idem material; consists of highly weathered tuff, contains silt and fine sand, light brown-yellowish, medium stiff to stiff, low water content, low plasticity. | | ● | | | | | 8 |
| SH | 1 | | | | | 10 | 3.00 | | | SPT 4; idem material; stiff. | | ● | | | | | 12 |
| SPT | 4 | 4 | 5 | 7 | 12 | 45 | 4.00 | | | From 3.60 to 10.00 m Silt; yellowish brown, very stiff, low water content, low plasticity, with fine sand traces | | ● | | | | | 20 |
| SPT | 5 | 7 | 10 | 10 | 20 | 35 | 5.00 | | | SPT 5; Idem material. | | ● | | | | | 19 |
| SPT | 6 | 9 | 9 | 10 | 19 | 35 | 6.00 | | | SPT 6; Idem material. | | ● | | | | | 23 |
| SPT | 7 | 9 | 10 | 13 | 23 | 25 | 7.00 | | | SPT 7; Idem material. | | ● | | | | | 24 |
| SPT | 8 | 9 | 10 | 14 | 24 | 40 | 8.00 | | | SPT 8; Idem material; with traces of fine to medium sand grained. | | ● | | | | | 20 |
| SPT | 9 | 7 | 9 | 11 | 20 | 40 | 9.00 | | | SPT 9; Idem material. | | ● | | | | | 23 |
| SPT | 10 | 9 | 10 | 13 | 23 | 45 | 10.00 | | | | | ● | | | | | 23 |

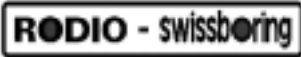


LOG OF BORING

BOREHOLE ZONA MEDIA

SHEET: 2/2

| CLIENT: KYOWA ENG. CONSU. | | PROJECT: ABASTECIMIENTO DE AGUA POTABLE DEL AREA URBANA | | DRILL RIG: CME-55 | | | | | | | | | | | | |
|----------------------------------|---------------|--|-------------|------------------------------------|---------|--------------|---------|-------------|-------------|---|----------|----|----|----|----|-----|
| COUNTRY: GUATEMALA | | DEL MUNICIPIO DE QUETZALTENANGO, GUATEMALA | | DRILLER: ERNESTO HERRERA | | | | | | | | | | | | |
| DEPTH: 20.45 m | | COORDINATES: | | DATE (STARTED-FINISHED): 22/01/04 | | | | | | | | | | | | |
| SOIL SAMPLING | | BORING LOCATION: ZONA MEDIA, QUETZALTENANGO | | LOGGED BY: RODOLFO ALVARADO | | | | | | | | | | | | |
| | | | | INSPECTOR: | | | | | | | | | | | | |
| SAMPLE TYP | SAMPLE NUMBER | 1 SET 15 cm | 2 SET 30 cm | 3 SET 45 cm | N VALUE | Cm RECOVERED | DEPTH m | SAMPLE TYPE | GRAPHIC LOG | DESCRIPTION | SPT TEST | | | | | |
| | | | | | | | | | | | 10 | 20 | 30 | 40 | 50 | >50 |
| SPT | 11 | 12 | 9 | 11 | 20 | 35 | 11 | | | From 10.00 to 13.00 m Tuff, highly weathered, consists of sandy silt, yellowish brown, very stiff, low to moderate water content, no plastic, with pumice traces up to 2 mm in size. | | | | | | 20 |
| SPT | 12 | 9 | 11 | 13 | 24 | 45 | 12 | | | SPT 12; Idem material; moderate plasticity | | | | | | 24 |
| SPT | 13 | 8 | 8 | 10 | 18 | 45 | 13 | | | SPT 13; Idem material. | | | | | | 18 |
| SPT | 14 | 13 | 16 | 13 | 29 | 35 | 14 | | | From 13.00 to 14.00 m Pumice sand, beige, gray, brown and yellow, moderate dense, medium and coarse grains, moderate water content, no plastic, with fine sand traces. | | | | | | 29 |
| SPT | 15 | 11 | 10 | 19 | 29 | 45 | 15 | | | From 14.00 to 17.00 m Sandy silt, yellowish brown, with white pumice grains, very stiff, low to moderate water content. | | | | | | 29 |
| SPT | 16 | 14 | 13 | 16 | 29 | 35 | 16 | | | SPT 16; Idem material; increase of the water content. | | | | | | 29 |
| SPT | 17 | 10 | 12 | 23 | 35 | 33 | 17 | | | SPT 17; Idem material, hard. | | | | | | 35 |
| SPT | 18 | 10 | 10 | 19 | 29 | 35 | 18 | | | From 17.00 to 19.20 m Pumice sand, with silty sand, whitish brown and yellowish brown, medium dense, fine to medium grains, with pumice fragments up to 2 cm in size, moderate water content, no plastic. | | | | | | 29 |
| SPT | 19 | 17 | 11 | 9 | 20 | 45 | 19 | | | SPT 19; Idem material. | | | | | | 20 |
| SPT | 20 | 31 | 39 | 46 | 85 | 40 | 20 | | | From 19.20 to 20.45 m Brecciaceous tuff, highly weathered, consists of fine sand, contains clasts up to 5 cm in size, dark brown-yellowish and gray. Idem material; in a silty matrix, dark brown, moderate water content, low plasticity, with rock fragments up to 1.5 cm in size | | | | | | 85 |
| SPT | 21 | 48 | 49 | >50 | >50 | 40 | 20.45 | | | 20.45 m END OF BORING | | | | | | >50 |



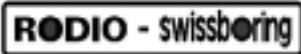
LOG OF BORING

BOREHOLE COLONIA MOLINA

SHEET: 1/2

| | | |
|--|---|---|
| CLIENT: KYOWA ENG. CONSU. | PROJECT: ABASTECIMIENTO DE AGUA POTABLE DEL AREA URBANA DEL MUNICIPIO DE QUETZALTENANGO, GUATEMALA | DRILL RIG: CME-55 |
| COUNTRY: GUATEMALA | | DRILLER: ERNESTO HERRERA |
| DEPTH: 20.45 m | COORDINATES: E 739228.9 - N 1539866.4 | DATE (STARTED-FINISHED): 23-24/01/04 |
| BORING LOCATION: COLONIA MOLINA, QUETZALTENANGO | | LOGGED BY: RODOLFO ALVARADO |
| SOIL SAMPLING | | INSPECTOR: |

| SAMPLE TYP | SAMPLE NUMBER | 1 SET 15 cm | 2 SET 30 cm | 3 SET 45 cm | N VALUE | Cm RECOVERED | DEPTH m | SAMPLE TYPE | GRAPHIC LOG | DESCRIPTION | SPT TEST | | | | | |
|------------|---------------|-------------|-------------|-------------|---------|--------------|--------------|-------------|-------------|--|----------|----|----|----|----|-----|
| | | | | | | | | | | | 10 | 20 | 30 | 40 | 50 | >50 |
| SPT | 1 | 3 | 3 | 5 | 8 | 30 | 0.00 - 1.60 | | | From 0.00 to 1.60 m Silt, yellowish brown, medium stiff to stiff, low water content, low plasticity, with organic contents (roots). SPT 2; idem material; stiff. | 8 | | | | | |
| SPT | 2 | 4 | 5 | 5 | 10 | 30 | 1.60 - 2.60 | | | From 1.60 to 2.60 m Sand with silt, yellowish brown, dense, fine, medium and coarse sand grains, low water content, with silt traces and rock fragments up to 1 cm in size. | 10 | | | | | |
| SPT | 3 | 6 | 14 | 17 | 31 | 33 | 2.60 - 4.00 | | | From 2.60 to 4.00 m Silty sand, light brown, medium dense, fine and medium sand grains, with sand and weathered rock traces, low plasticity, low water content. | 31 | | | | | |
| SPT | 4 | 9 | 10 | 10 | 20 | 45 | 4.00 - 4.50 | | | From 4.00 to 4.50 m Weathered tuff; sandy silt, light to dark brown, hard, low water content, low plasticity, with traces of weathered rock fragments. | 20 | | | | | |
| SPT | 5 | 14 | 27 | 26 | 53 | 45 | 4.50 - 14.00 | | | From 4.50 to 14.00 m Fine sand, with rock fragments, light gray, medium dense, low water content, no plastic, contains rock fragments up to 4 cm in size. | 53 | | | | | |
| SPT | 6 | 17 | 9 | 11 | 20 | 45 | | | | SPT 6; Idem material, dense. | 20 | | | | | |
| SPT | 7 | 10 | 17 | 22 | 39 | 40 | | | | SPT 7; Idem material, dense. | 39 | | | | | |
| SPT | 8 | 19 | 31 | 36 | 67 | 45 | | | | SPT 8; Idem material; very dense, moderate water content. | 67 | | | | | |
| SPT | 9 | 32 | 50 | >50 | >50 | 33 | | | | SPT 9; Idem material. | >50 | | | | | |
| SPT | 10 | 17 | 31 | 39 | 70 | 40 | | | | SPT 10; Idem material. | 70 | | | | | |



LOG OF BORING

BOREHOLE COLONIA MOLINA
SHEET: 2/2

| CLIENT: KYOWA ENG. CONSU. | | PROJECT: ABASTECIMIENTO DE AGUA POTABLE DEL AREA URBANA DEL MUNICIPIO DE QUETZALTENANGO, GUATEMALA | | | | DRILL RIG: CME-55 | | | | | | | | | | |
|----------------------------------|---------------|---|-------------|-------------|---------|--|---------|-------------|-------------|--|----------|----|----|----|----|-----|
| COUNTRY: GUATEMALA | | | | | | DRILLER: ERNESTO HERRERA | | | | | | | | | | |
| DEPTH: 20.45 m | | COORDINATES: | | | | DATE (STARTED-FINISHED): 23-24/01/04 | | | | | | | | | | |
| SOIL SAMPLING | | BORING LOCATION: COLONIA MOLINA, QUETZALTENANGO | | | | LOGGED BY: RODOLFO ALVARADO INSPECTOR: | | | | | | | | | | |
| SAMPLE TYP | SAMPLE NUMBER | 1 SET 15 cm | 2 SET 30 cm | 3 SET 45 cm | N VALUE | Cm RECOVERED | DEPTH m | SAMPLE TYPE | GRAPHIC LOG | DESCRIPTION | SPT TEST | | | | | |
| | | | | | | | | | | | 10 | 20 | 30 | 40 | 50 | >50 |
| SPT | 11 | 48 | >50 | | >50 | 22 | 11 | | | SPT 11; idem material, very dense, consists of fine sand, with rock fragments, light gray, low water content, no plastic, contains rock fragments up to 4 cm in size. | | | | | | >50 |
| SPT | 12 | 49 | >50 | | >50 | 12 | 12 | | | SPT 12; Idem material. | | | | | | >50 |
| SPT | 13 | 21 | 35 | 32 | 67 | 40 | 13 | | | SPT 13; Idem material. | | | | | | 67 |
| SPT | 14 | 41 | 48 | >50 | >50 | 20 | 14 | | | SPT 14; Idem material. | | | | | | >50 |
| SPT | 15 | >50 | | | >50 | 7 | 15 | | | From 14.00 to 18.50 m Fine and medium sand, light brown, very dense, moderate water content, no plastic, with traces of coarse sand and rock fragments and pumice up to 3 cm in size. | | | | | | >50 |
| SPT | 16 | >50 | | | >50 | 8 | 16 | | | SPT 15; Idem material. | | | | | | >50 |
| SPT | 17 | 24 | 30 | 31 | 61 | 38 | 17 | | | SPT 16; Idem material. | | | | | | 61 |
| SPT | 18 | 47 | 49 | >50 | >50 | 25 | 18 | | | SPT 17; Idem material. | | | | | | >50 |
| SPT | 19 | 46 | 48 | >50 | >50 | 35 | 19 | | | SPT 18; Idem material. | | | | | | >50 |
| SPT | 20 | 28 | 39 | 40 | 79 | 40 | 20 | | | From 18.50 to 20.45 m Sand with rock fragments, brown to light gray, moderate water content, no plastic, sand of fine, medium and coarse grains, with weathered rock fragments and pumice up to 2 cm in size. | | | | | | 79 |
| SPT | 21 | 28 | 39 | 40 | 79 | 40 | 20.45 | | | SPT 21; Idem material. 20.45 m END OF BORING | | | | | | 79 |

Dr. Rodolfo Semrau Lago

Geotecnia y Cimentaciones

SUMMARY OF LABORATORY TESTS RESULTS
PROJECT: ABASTECIMIENTO DE AGUA POTABLE DEL AREA
URBANA DEL MUNICIPIO DE QUETZALTENANGO, GUATEMALA, C.A.
BOREHOLE: S-1 ZONA ALTA

| SAMPLE No. | SAMPLE DEPTH (meters) | DESCRIPTION | MOISTURE CONTENT (%) | SIEVE ANALYSIS | | | ATTERBERG LIMITS | | CLASSIFICATION | Shear Strength | | | WET UNIT WEIGHT gr/cm ³ | Specific Gravity |
|------------|-----------------------|---|----------------------|----------------|----------|-----------|------------------|-----|----------------|----------------|---------|----|------------------------------------|------------------|
| | | | | GRAVEL (%) | SAND (%) | FINES (%) | LL | PI | | Type | C (kPa) | Ø | | |
| SPT 1 | 0.00 - 0.45 | Dark brown fine silty sand of low plasticity, with a trace of gravel. | 19 | 1.2 | 56.2 | 42.6 | 32 | 3 | SM | -- | -- | -- | -- | 2.66 |
| SPT 2 | 1.00 - 1.45 | Dark brown sandy silt of low plasticity | 44 | 0 | 34.6 | 65.4 | 38 | 2 | ML | -- | -- | -- | -- | 2.65 |
| SPT 3 | 2.00 - 2.45 | Dark brown sandy silt of low plasticity | 43 | 0 | 39.4 | 60.6 | 37 | 1 | ML | -- | -- | -- | -- | 2.55 |
| SHELBY 1 | 3.00 - 3.50 | Dark brown sandy silt of low plasticity, with pumice fragments | 44 | --- | --- | --- | --- | --- | --- | UU | 110 | 20 | --- | --- |
| SPT 4 | 3.50 - 3.95 | Yellowish brown plastic silt with fine sand | 39 | 0.2 | 28.1 | 71.7 | 40 | 4 | ML | -- | -- | -- | -- | 2.57 |
| SPT 5 | 5.00 - 5.45 | Yellowish brown plastic silt with fine sand | 44 | 0 | 26.4 | 73.6 | 37 | 1 | ML | -- | -- | -- | -- | 2.70 |
| SPT 6 | 6.00 - 6.45 | Dark brown plastic silt with fine sand | 55 | 0 | 25.6 | 74.4 | 49 | 8 | ML | -- | -- | -- | -- | 2.53 |
| SPT 7 | 7.00 - 7.45 | Dark brown silt of low plasticity with fine sand | 56 | 0 | 27.3 | 72.7 | 49 | 2 | ML | -- | -- | -- | -- | 2.48 |
| SPT 8 | 8.00 - 8.45 | Dark brown plastic sandy silt | 48 | 0 | 31.4 | 68.6 | 40 | 2 | ML | -- | -- | -- | -- | 2.53 |
| SPT 9 | 9.00 - 9.45 | Dark yellowish brown plastic sandy silt | 38 | 0 | 32.8 | 67.2 | 38 | 9 | ML | -- | -- | -- | -- | 2.55 |
| SPT 10 | 10.00 - 10.45 | Dark yellowish brown plastic sandy silt | 38 | 0 | 38.6 | 61.4 | 42 | 5 | ML | -- | -- | -- | -- | 2.51 |

Dr. Rodolfo Semrau Lago

Geotecnia y Cimentaciones

SUMMARY OF LABORATORY TESTS RESULTS
PROJECT: ABASTECIMIENTO DE AGUA POTABLE DEL AREA
URBANA DEL MUNICIPIO DE QUETZALTENANGO, GUATEMALA, C.A.
BOREHOLE: S-1 ZONA ALTA

| SAMPLE No. | SAMPLE DEPTH (meters) | DESCRIPTION | MOISTURE CONTENT (%) | SIEVE ANALYSIS | | | ATTERBERG LIMITS | | CLASSIFICATION | Shear Strength | | | WET UNIT WEIGHT gr/cm ³ | Specific Gravity |
|------------|-----------------------|---|----------------------|----------------|----------|-----------|------------------|----|----------------|----------------|---------|-----|------------------------------------|------------------|
| | | | | GRAVEL (%) | SAND (%) | FINES (%) | LL | IP | | Type | C (kPa) | Ø | | |
| SPT 11 | 11.00 - 11.45 | Dark yellowish brown plastic sandy silt. with fine sand | 54 | 0 | 28.4 | 71.6 | 47 | 10 | ML | --- | --- | --- | --- | 2.43 |
| SPT 12 | 12.00 - 12.45 | Dark yellowish brown plastic sandy silt | 50 | 0 | 33.3 | 66.7 | 46 | 8 | ML | --- | --- | --- | --- | 2.45 |
| SPT 13 | 13.00 - 13.45 | Medium to coarse white non plastic sand brown specks, with silt and a trace of gravel | 31 | 4.1 | 81.2 | 14.7 | NP | NP | SM | --- | --- | --- | --- | 2.57 |
| SPT 14 | 14.00 - 14.45 | Dark brown plastic silt with fine sand | 38 | 0 | 28.3 | 71.7 | 30 | 7 | ML | --- | --- | --- | --- | 2.57 |
| SPT 15 | 15.00 - 15.45 | Dark brown plastic silt with fine sand | 41 | 0 | 24.5 | 75.5 | 41 | 8 | ML | --- | --- | --- | --- | 2.67 |
| SPT 16 | 16.00 - 16.45 | Light brown non plastic sandy silt | 39 | 0 | 36.3 | 63.7 | NP | NP | ML | --- | --- | --- | --- | 2.59 |
| SPT 17 | 17.00 - 17.45 | Light brown plastic sandy silt | 37 | 0 | 39 | 61 | 41 | 11 | ML | --- | --- | --- | --- | 2.56 |
| SPT 18 | 18.00 - 18.45 | Fine light gray non plastic pumice sand, with a trace of gravel | 27 | 4.2 | 63.7 | 32.2 | NP | NP | SM | --- | --- | --- | --- | 2.18 |
| SPT 19 | 19.00 - 19.45 | Fine light gray plastic pumice sand, with a trace of gravel | 32 | 8 | 43.6 | 48.5 | 37 | 6 | SM | --- | --- | --- | --- | 2.53 |
| SPT 20 | 20.00 - 20.45 | Medium to coarse non plastic pumice sand, with gravel and silt | 45 | 29.5 | 49.2 | 21.3 | NP | NP | SM | --- | --- | --- | --- | 2.39 |

Dr. Rodolfo Semrau Lago

Geotecnia y Cimentaciones

SUMMARY OF LABORATORY TESTS RESULTS
PROJECT: ABASTECIMIENTO DE AGUA POTABLE DEL AREA
URBANA DEL MUNICIPIO DE QUETZALTENANGO, GUATEMALA, C.A.
BOREHOLE: S-2 ZONA MEDIA

| SAMPLE No. | SAMPLE DEPTH (meters) | DESCRIPTION | MOISTURE CONTENT (%) | SIEVE ANALYSIS | | | ATTERBERG LIMITS | | CLASSIFICATION | Shear Strength | | | WET UNIT WEIGHT gr/cm ³ | Specific Gravity |
|------------|-----------------------|--|----------------------|----------------|----------|-----------|------------------|----|----------------|----------------|---------|----|------------------------------------|------------------|
| | | | | GRAVEL (%) | SAND (%) | FINES (%) | LL | PI | | Type | C (kPa) | φ | | |
| SPT 1 | 0.00 - 0.45 | Fine dark brown plastic silty sand | 19 | 0 | 50.1 | 49.9 | 37 | 6 | SM | -- | -- | -- | -- | 2.68 |
| SPT 2 | 1.00 - 1.45 | Dark brown plastic sandy silt | 39 | 0.8 | 33.1 | 66.1 | 43 | 7 | ML | -- | -- | -- | -- | 2.58 |
| SPT 3 | 2.00 - 2.45 | Light yellowish brown plastic sandy silt | 36 | 0 | 33 | 67 | 42 | 8 | ML | -- | -- | -- | -- | 2.57 |
| SHELBY 1 | 2.45 - 2.80 | Yellowish brown plastic sandy silt | 26 | -- | -- | -- | -- | -- | -- | UU | 28 | 31 | 1.54 | -- |
| SPT 4 | 3.00 - 3.45 | Light brown fine silty sand of low plasticity | 28 | 0 | 51.1 | 48.9 | 34 | 2 | SM | -- | -- | -- | -- | 2.55 |
| SPT 5 | 4.00 - 4.45 | Yellowish brown low plasticity silt with fine sand | 35 | 0 | 26.7 | 73.3 | 37 | 4 | ML | -- | -- | -- | -- | 2.52 |
| SPT 6 | 5.00 - 5.45 | Brown plastic sandy silt | 36 | 0 | 32.7 | 67.3 | 37 | 7 | ML | -- | -- | -- | -- | 2.57 |
| SPT 7 | 6.00 - 6.45 | Yellowish brown plastic sandy silt with fine sand | 42 | 0 | 28.5 | 71.5 | 41 | 7 | ML | -- | -- | -- | -- | 2.63 |
| SPT 8 | 7.00 - 7.45 | Yellowish brown plastic silt with fine sand | 51 | 0 | 29 | 71 | 45 | 7 | ML | -- | -- | -- | -- | 2.66 |
| SPT 9 | 8.00 - 8.45 | Yellowish brown plastic silt with fine sand | 42 | 0.4 | 32 | 67.6 | 45 | 7 | ML | -- | -- | -- | -- | 2.67 |
| SPT 10 | 9.00 - 9.45 | Yellowish brown plastic silt | 48 | 0 | 28.9 | 71.1 | 42 | 6 | ML | -- | -- | -- | -- | 2.68 |

Dr. Rodolfo Semrau Lago

Geotecnia y Cimentaciones

SUMMARY OF LABORATORY TESTS RESULTS
PROJECT: ABASTECIMIENTO DE AGUA POTABLE DEL AREA
URBANA DEL MUNICIPIO DE QUETZALTENANGO, GUATEMALA, C.A.
BOREHOLE: S-2 ZONA MEDIA

| SAMPLE No. | SAMPLE DEPTH (meters) | DESCRIPTION | MOISTURE CONTENT (%) | SIEVE ANALYSIS | | | ATTERBERG LIMITS | | CLASSIFICATION | Shear Strength | | | WET UNIT WEIGHT gr/cm ³ | Specific Gravity |
|------------|-----------------------|---|----------------------|----------------|----------|-----------|------------------|----|----------------|----------------|---------|----|------------------------------------|------------------|
| | | | | GRAVEL (%) | SAND (%) | FINES (%) | LL | PI | | Type | C (kPa) | φ | | |
| SPT 11 | 10.00 - 10.45 | Yellowish brown plastic silt with fine sand | 36 | 0 | 45.5 | 54.5 | 32 | 6 | ML | -- | -- | -- | --- | 2.57 |
| SPT 12 | 11.00 - 11.45 | Yellowish brown plastic silt | 43 | 0 | 34.8 | 65.2 | 38 | 6 | ML | -- | -- | -- | --- | 2.57 |
| SPT 13 | 12.00 - 12.45 | Yellowish brown plastic silt | 44 | 0 | 32.2 | 67.8 | 40 | 7 | ML | -- | -- | -- | --- | 2.59 |
| SPT 14 | 13.00 - 13.45 | Beige medium to coarse non plastic pumice sand with a trace of pumitic gravel | 28 | 7.9 | 77.4 | 14.7 | NP | NP | SM | -- | -- | -- | --- | 2.45 |
| SPT 15 | 14.00 - 14.45 | Yellowish brown plastic silt with fine sand | 36 | 0 | 28.4 | 71.6 | 38 | 8 | ML | -- | -- | -- | --- | 2.6 |
| SPT 16 | 15.00 - 15.45 | Yellowish brown plastic silt with fine sand | 37 | 2.1 | 30.5 | 67.3 | 39 | 6 | ML | -- | -- | -- | --- | 1.94 |
| SPT 17 | 16.00 - 16.45 | Yellowish brown plastic silt with fine sand | 37 | 0.6 | 38.1 | 61.4 | 42 | 8 | ML | -- | -- | -- | --- | 2.56 |
| SPT 18 | 17.00 17.45 | Whiteish brown fine non plastic pumice sand | 31 | 3.4 | 55.4 | 41.2 | NP | NP | SM | -- | -- | -- | --- | 2.46 |
| SPT 19 | 18.00 18.45 | Whiteish brown fine non plastic pumice sand | 32 | 32.7 | 53.6 | 13.8 | NP | NP | SM | -- | -- | -- | --- | 2.54 |
| SPT 20 | 19.00 - 19.45 | Whiteish brown fine and yellowish brown medium to coarse non plastic pumice sand with gravel and silt | 27 | 12.1 | 64 | 23.9 | NP | NP | SM | -- | -- | -- | --- | 2.7 |
| SPT 21 | 20.00 - 20.45 | Whiteish brown fine and yellowish brown medium to coarse non plastic pumice sand with gravel and silt | 34 | 28.4 | 50.1 | 21.5 | 44 | 8 | SM | -- | -- | -- | --- | 2.69 |

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Geotecnia y Cimentaciones

SUMMARY OF LABORATORY TESTS RESULTS

PROJECT: ABASTECIMIENTO DE AGUA POTABLE DEL AREA URBANA DEL MUNICIPIO DE QUETZALTENANGO, GUATEMALA, C.A.
BOREHOLE: S-3 ZONA BAJA, COLONIA MOLINA

| SAMPLE No. | SAMPLE DEPTH (meters) | DESCRIPTION | MOISTURE CONTENT (%) | SIEVE ANALYSIS | | | ATTERBERG LIMITS | | CLASSIFICATION | Shear Strength | | | WET UNIT WEIGHT gr/cm ³ | Specific Gravity |
|------------|-----------------------|--|----------------------|----------------|----------|-----------|------------------|----|----------------|----------------|---------|-----|------------------------------------|------------------|
| | | | | GRAVEL (%) | SAND (%) | FINES (%) | LL | PI | | Type | C (kPa) | Ø | | |
| SPT 1 | 0.00 - 0.45 | Yellowish brown plastic sandy silt with a trace of gravel | 10 | 2.3 | 34.4 | 63.3 | 38 | 6 | ML | --- | --- | --- | --- | 2.55 |
| SPT 2 | 1.00 - 1.45 | Yellowish brown plastic sandy silt with a trace of gravel | 13 | 1.2 | 43.1 | 55.7 | 35 | 5 | ML | --- | --- | --- | --- | 2.67 |
| SPT 3 | 2.00 - 2.45 | Yellowish brown medium to coarse non plastic sand with a trace of gravel | 7 | 2.8 | 70.4 | 26.8 | NP | NP | SM | --- | --- | --- | --- | 2.64 |
| SPT 4 | 3.00 - 3.45 | Light brown plastic sandy silt with a trace of gravel | 15 | 1.8 | 40.2 | 58 | 27 | 6 | CL-ML | --- | --- | --- | --- | 2.58 |
| SPT 5 | 4.00 - 4.45 | Light to dark brown plastic silty sandy clay with a trace of gravel | 15 | 5.8 | 36.2 | 58 | 29 | 9 | CL | --- | --- | --- | --- | 2.45 |
| SPT 6 | 5.00 - 5.45 | Light gray non plastic silt with medium to coarse sand and a trace of gravel | 6 | 12.2 | 28.6 | 59.1 | NP | NP | ML | --- | --- | --- | --- | 2.5 |
| SPT 7 | 6.00 - 6.45 | Light gray non plastic medium to coarse sand with gravel and silt | 6 | 11.2 | 74.2 | 14.6 | NP | NP | SM | --- | --- | --- | --- | 2.54 |
| SPT 8 | 7.00 - 7.45 | Light gray non plastic medium to coarse sand with silt and a trace of gravel | 7 | 6.4 | 72.2 | 21.4 | NP | NP | SM | --- | --- | --- | --- | 2.55 |
| SPT 9 | 8.00 - 8.40 | Light gray non plastic medium to coarse sand with gravel and silt | 5 | 23.1 | 50.3 | 26.5 | NP | NP | SM | --- | --- | --- | --- | 2.53 |
| SPT 10 | 9.00 - 9.45 | Light gray non plastic medium to coarse sand with gravel and silt | 5 | 21.1 | 65.1 | 13.8 | NP | NP | SM | --- | --- | --- | --- | 2.53 |

Dr. Rodolfo Semrau Lago

Geotecnia y Cimentaciones

SUMMARY OF LABORATORY TESTS RESULTS

PROJECT: ABASTECIMIENTO DE AGUA POTABLE DEL AREA
URBANA DEL MUNICIPIO DE QUETZALTENANGO, GUATEMALA, C.A.
BOREHOLE: S-3 ZONA BAJA, COLONIA MOLINA

| SAMPLE No. | SAMPLE DEPTH (meters) | DESCRIPTION | MOISTURE CONTENT (%) | SIEVE ANALYSIS | | | ATTERBERG LIMITS | | CLASSIFICATION | Shear Strength | | | WET UNIT WEIGHT gr/cm ³ | Specific Gravity |
|------------|-----------------------|---|----------------------|----------------|----------|-----------|------------------|----|----------------|----------------|---------|-----|------------------------------------|------------------|
| | | | | GRAVEL (%) | SAND (%) | FINES (%) | LL | PI | | Type | C (kPa) | Ø | | |
| SPT 11 | 10.00 - 10.22 | Light gray non plastic medium to coarse sand with a trace of gravel | 5 | 7.1 | 62.5 | 30.3 | NP | NP | SM | --- | --- | --- | --- | 2.54 |
| SPT 12 | 11.00 - 11.22 | Light gray non plastic medium to coarse sand with gravel and silt | 8 | 15.3 | 62.2 | 22.5 | NP | NP | SM | --- | --- | --- | --- | 2.52 |
| SPT 13 | 12.00 - 12.45 | Light gray non plastic medium to coarse sand with gravel and silt | 4 | 28 | 59.9 | 12.1 | NP | NP | SM | --- | --- | --- | --- | 2.53 |
| SPT 14 | 13.00 - 13.45 | Light gray non plastic medium to coarse sand with gravel and silt | 5 | 19 | 55.4 | 25.7 | NP | NP | SM | --- | --- | --- | --- | 2.58 |
| SPT 15 | 14.00 - 14.07 | Light gray non plastic medium to coarse sand with gravel and silt | 4 | 10.4 | 75.4 | 14.2 | NP | NP | SM | --- | --- | --- | --- | 2.52 |
| SPT 16 | 15.00 - 15.10 | Light gray non plastic medium to coarse sand with gravel and silt | 4 | 21.4 | 57.8 | 20.8 | NP | NP | SM | --- | --- | --- | --- | 2.49 |
| SPT 17 | 16.00 - 16.45 | Light gray non plastic medium to coarse sand with gravel and silt | 9 | 9.8 | 66.6 | 23.5 | NP | NP | SM | --- | --- | --- | --- | 2.51 |
| SPT 18 | 17.00 - 17.40 | Light gray non plastic medium to coarse sand with gravel and silt | 4 | 22.9 | 54.4 | 22.6 | NP | NP | SM | --- | --- | --- | --- | 2.51 |
| SPT 19 | 18.00 - 18.40 | Light gray non plastic medium to coarse sand with gravel and silt | 4 | 11.4 | 63.2 | 25.4 | NP | NP | SM | --- | --- | --- | --- | 2.58 |
| SPT 20 | 19.00 - 19.45 | Light gray non plastic medium to coarse sand with gravel and silt | 6 | 13.1 | 61.6 | 25.3 | NP | NP | SM | --- | --- | --- | --- | 2.54 |