National Pollutant Discharge Elimination System (NPDES) Permit Program

F A C T S H E E T

Regarding an NPDES Permit To Discharge to Waters of the State of Ohio
for **Thomas Steel Strip Corporation**

Public Notice No.: 09-07-016
Public Notice Date: July 15, 2009
Comment Period Ends: August 15, 2009

OEPA Permit No.: **3IC00056*JD**
Application No.: **OH0011363**

Name and Address of Applicant:

Thomas Steel Strip Corporation
Delaware Avenue NW
Warren, Ohio 44485

Name and Address of Facility Where Discharge Occurs:

Thomas Steel Strip Corporation
Delaware Avenue NW
Warren, Ohio 44485
Trumbull County

Receiving Water: **Mahoning River via Dickey Run storm sewer**

Subsequent Stream Network: **Beaver River to Ohio River**

Introduction

Development of a Fact Sheet for NPDES permits is mandated by Title 40 of the Code of Federal Regulations, Section 124.8 and 124.56. This document fulfills the requirements established in those regulations by providing the information necessary to inform the public of actions by the Ohio Environmental Protection Agency, as well as the methods by which the public can participate in the process of finalizing those actions.

This Fact Sheet is prepared in order to document the technical basis and risk management decisions that are considered in the determination of water quality based NPDES Permit effluent limitations. The technical basis for the Fact Sheet may consist of evaluations of promulgated effluent guidelines, existing effluent quality, instream biological, chemical and physical conditions, and the relative risk of alternative effluent limitations. This Fact Sheet details the discretionary decision-making process empowered to the Director by the Clean Water Act and Ohio Water Pollution Control Law (ORC 6111). Decisions to award variances to Water Quality Standards or promulgated effluent guidelines for economic or technological reasons will also be justified in the Fact Sheet where necessary.

Effluent limits based on available treatment technologies are required by Section 301(b) of the Clean Water Act. Many of these have already been established by U.S. EPA in the effluent guideline regulations (a.k.a. categorical regulations) for industry categories in 40 CFR Parts 405-499. Technology-based regulations for publicly-owned treatment works are listed in the Secondary Treatment Regulations (40 CFR Part 133). If regulations have not been established for a category of dischargers, the director may establish technology-based limits based on best professional judgment (BPJ).

Ohio EPA reviews the need for water-quality-based limits on a pollutant-by-pollutant basis. Wasteload allocations are used to develop these limits based on the pollutants that have been detected in the discharge, and the receiving water's assimilative capacity. The assimilative capacity depends on the flow in the water receiving the discharge, and the concentration of the pollutant upstream. The greater the upstream flow, and the lower the upstream concentration, the greater the assimilative capacity is. Assimilative capacity may represent dilution (as in allocations for metals), or it may also incorporate the break-down of pollutants in the receiving water (as in allocations for oxygen-demanding materials).

The need for water-quality-based limits is determined by comparing the wasteload allocation for a pollutant to a measure of the effluent quality. The measure of effluent quality is called PEQ - Projected Effluent Quality. This is a statistical measure of the average and maximum effluent values for a pollutant. As with any statistical method, the more data that exists for a given pollutant, the more likely that PEQ will match the actual observed data. If there is a small data set for a given pollutant, the highest measured value is multiplied by a statistical factor to obtain a PEQ; for example if only one sample exists, the factor is 6.2, for two samples - 3.8, for three samples - 3.0. The factors continue to decline as samples sizes increase. These factors are intended to account for effluent variability, but if the pollutant concentrations are fairly constant, these factors may make PEQ appear larger than it would be shown to be if more sample results existed.

Summary of Permit Modifications

These permit modifications represent the settlement of Thomas Steel's appeal of the permit issued by Ohio EPA in June 2008. Permit Conditions changed include:

- Outfall 001 Initial, Interim and Final Limits – Change the chromium and lead monitoring requirements from 1/week to 1/month;
- Outfall 001 Interim Limits – Remove the 30-day limits for residual chlorine; remove the cadmium monitoring requirement that was erroneously included in the table;
- Outfall 001 Final Limits – Remove the 30-day limits for residual chlorine; remove the 30-day limits for free cyanide based on updated modeling; change the final toxicity limit from 1.5 acute toxicity units (TUa) to 2.5 TUa to match the initial and interim tables.
- Part II., Item S. – Revise the toxicity study to increase the initial monitoring frequency and make other changes;
- Part III, - Include updated reporting and other conditions applicable to all permits.

See the Basis for Modification Section on page 9 for a full discussion of these changes.

Procedures for Participation in the Formulation of Final Determinations

The draft action shall be issued as a final action unless the Director revises the draft after consideration of the record of a public meeting or written comments, or upon disapproval by the Administrator of the U.S. Environmental Protection Agency.

Within thirty days of the date of the Public Notice, any person may request or petition for a public meeting for presentation of evidence, statements or opinions. The purpose of the public meeting is to obtain additional evidence. Statements concerning the issues raised by the party requesting the meeting are invited. Evidence may be presented by the applicant, the state, and other parties, and following presentation of such evidence other interested persons may present testimony of facts or statements of opinion.

Requests for public meetings shall be in writing and shall state the action of the Director objected to, the questions to be considered, and the reasons the action is contested. Such requests should be addressed to:

Legal Records Section
Ohio Environmental Protection Agency
P.O. Box 1049
Columbus, Ohio 43216-1049

Interested persons are invited to submit written comments upon the discharge permit. Comments should be submitted in person or by mail no later than 30 days after the date of this Public Notice. Deliver or mail all comments to:

Ohio Environmental Protection Agency
Attention: Division of Surface Water
Permits and Compliance Section
P.O. Box 1049
Columbus, Ohio 43216-1049

The OEPA permit number and Public Notice numbers should appear on each page of any submitted comments. All comments received no later than 30 days after the date of the Public Notice will be considered.

Citizens may conduct file reviews regarding specific companies or sites. Appointments are necessary to conduct file reviews, because requests to review files have increased dramatically in recent years. The first 250 pages copied are free. For requests to copy more than 250 pages, there is a five-cent charge for each page copied. Payment is required by check or money order, made payable to Treasurer State of Ohio.

For additional information about this fact sheet or the draft permit, contact Erm Gomes at (330) 963-1196 (erm.gomes@epa.state.oh.us) or Eric Nygaard at (614) 644-2024 (eric.nygaard@epa.state.oh.us)

Location of Discharge/Receiving Water Use Classification

Thomas Steel discharges to the Mahoning River at River Mile (RM) 39.06 through the Dickey Run storm sewer. The approximate location of the facility is shown in Figure 1.

This segment of the Mahoning River is described by Ohio EPA River Code: 18-001, U.S. EPA River Reach #: 05030103-007, County: Trumbull, Ecoregion: Erie-Ontario Lake Plain. The Mahoning River is designated for the following uses under Ohio's Water Quality Standards (OAC 3745-1-25): Warmwater Habitat (WWH), Agricultural Water Supply (AWS), Industrial Water Supply (IWS), and Primary Contact Recreation (PCR).

Use designations define the goals and expectations of a waterbody. These goals are set for aquatic life protection, recreation use and water supply use, and are defined in the Ohio WQS (OAC 3745-1-07). The use designations for individual waterbodies are listed in rules -08 through -32 of the Ohio WQS. Once the goals are set, numeric water quality standards are developed to protect these uses. Different uses have different water quality criteria.

Use designations for aquatic life protection include habitats for coldwater fish and macroinvertebrates, warmwater aquatic life and waters with exceptional communities of warmwater organisms. These uses all meet the goals of the federal Clean Water Act. Ohio WQS also include aquatic life use designations for waterbodies which can not meet the Clean Water Act goals because of human-caused conditions that can not be remedied without causing fundamental changes to land use and widespread economic impact. The dredging and clearing of some small streams to support agricultural or urban drainage is the most common of these conditions. These streams are given Modified Warmwater or Limited Resource Water designations.

Recreation uses are defined by the depth of the waterbody and the potential for wading or swimming. Uses are defined for bathing waters, swimming/canoeing (Primary Contact) and wading only (Secondary Contact - generally waters too shallow for swimming or canoeing).

Water supply uses are defined by the actual or potential use of the waterbody. Public Water Supply designations apply near existing water intakes so that waters are safe to drink with standard treatment. Most other waters are designated for agricultural and industrial water supply.

Facility Description

Thomas Steel Strip manufactures cold-reduced steel strip, some of which is electroplated with nickel, copper, brass, or a nickel-zinc alloy. Production is estimated at 512 tons per day. Processes include pickling, cold rolling, annealing, temper rolling, slitting, and electroplating. The process operations are categorized under the Standard Industrial Classification (SIC) Code 3471, "Electroplating Cold Rolled Steel Strip" and SIC Code 3316, "Cold Rolled Steel Strip." Process wastewaters from these operations are regulated under Federal Effluent Guidelines 40 CFR Parts 420.102 and 420.103 (Iron and Steel Manufacturing) and CFR Parts 433.13 and 433.14 (Metal Finishing).

Description of Existing Discharge

Table 1 shows the monitored discharges at Thomas Steel Strip, with a summary of treatment:

Table 1. Description of Thomas Steel Strip Outfalls

Outfall #	Type of Wastewater	Treatment Used	Discharge Point	Avg. Discharge (in MGD)
001	- Stormwater - Noncontact cooling water - Process wastewater	- Sedimentation	Mahoning River via storm sewer	1.32
601	- Electroplating rinse waters - Pretreated chromium wastewater - Pretreated cyanide wastewater - Pretreated cold rolling wastewater	- Coagulation - Neutralization - Chemical precipitation - Flocculation - Pressure filtration (solids) - Heat drying (solids)	Outfall 001	0.38
603	- Cyanide-bearing wastewater	- Chemical oxidation - Chemical reduction	Outfall 601 treatment	0.008

The draft permit contains monitoring and limits at internal stations 601 and 603 . Effluent guideline limits are applied at these outfalls to ensure that these treatment standards are met prior to combining with other wastestreams. If monitoring was not done at this location, it would not be possible to verify compliance with these standards due to dilution. Federal rules [40 CFR 125.3(f)] prohibit attaining these standards by dilution.

Tables 2 and 3 summarize the results of acute and chronic whole effluent toxicity tests of the final effluent.

Assessment of Impact on Receiving Waters

An assessment of the impact of a permitted point source on the immediate receiving waters includes an evaluation of the available chemical/physical[1], biological[2], and habitat data which have been collected by Ohio EPA pursuant to the Five-Year Basin Approach for Monitoring and NPDES Reissuance. Other data may be used provided it was collected in accordance with Ohio EPA methods and protocols as specified by the Ohio Water Quality Standards and Ohio EPA guidance documents. Other information which may be evaluated includes, but is not limited to:

- NPDES permittee self-monitoring data;
- Effluent and mixing zone bioassays conducted by Ohio EPA, the permittee, or U.S. EPA.

In evaluating this data, Ohio EPA attempts to link environmental stresses and measured pollutant exposure to the health and diversity of biological communities. Stresses can include pollutant discharges (permitted and unpermitted), land use effects, and habitat modifications. Indicators of exposure to these stresses include whole effluent toxicity tests, fish tissue chemical data, and fish health biomarkers (for example, fish blood tests).

Use attainment is a term which describes the degree to which environmental indicators are either above or below criteria specified by the Ohio Water Quality Standards (WQS; Ohio Administrative Code 3745-1). Assessing use attainment status for aquatic life uses primarily relies on the Ohio EPA biological criteria (OAC 3745-1-07; Table 7-15). These criteria apply to rivers and streams outside of mixing zones. Numerical biological criteria are based on measuring several characteristics of the fish and macroinvertebrate communities; these characteristics are combined into multimetric biological indices including the Index of Biotic Integrity (IBI) and modified Index of Well-Being (MIwb), which indicate the response of the fish community, and the Invertebrate Community Index (ICI), which indicates the response of the macroinvertebrate community. Numerical criteria are broken down by ecoregion, use designation, and stream or river size. Ohio has five ecoregions defined by common topography, land use, potential vegetation and soil type.

Three attainment status results are possible at each sampling location -full, partial, or non-attainment. Full attainment means that all of the applicable indices meet the biocriteria. Partial attainment means that one or more of the applicable indices meet the biocriteria or one of the organism groups reflects poor or very poor performance. An aquatic life use attainment table (see Table _) is constructed based on the sampling results and is arranged from upstream to downstream and includes the sampling locations indicated by river mile, the applicable biological indices, the use attainment status (*i.e.*, full, partial, or non), the Qualitative Habitat Evaluation Index (QHEI), and comments and observations for each sampling location.

[1] water column, effluent, and sediment chemistry, flows
[2] fish and macroinvertebrate assemblages

Thomas Steel Strip Corporation
Historical data (from 1994) show that this river segment did not meet the designated warmwater habitat aquatic life use. Ohio EPA believes that this non-attainment continues to exist, based on limited biological sampling from 2002 and 2003, along with historical chemical data on stream sediments and recent fish tissue chemistry.

The summary sheet from Ohio's 2006 Integrated Water Quality Monitoring and Assessment Report is attached to this fact sheet. The complete Integrated Report can be found on the Agency website at: http://www.epa.state.oh.us/dsw/tmdl/2006IntReport/2006OhioIntegratedReport.html.

Since that report was issued, Ohio EPA conducted a macroinvertebrate survey to check previous conclusions that the Thomas Steel contributed to toxicity in areas of the Mahoning River near the Dickey Run discharge. Sampling conducted in 2006 included upstream, mixing zone and downstream results that duplicated sites sampled during the 1994 Mahoning River survey (Summit Street - RM 39.1, the Thomas Steel mixing zone - RM 39.06, and at Market Street (RM 38.3)). Ohio EPA sampled macroinvertebrates, water, and stream sediments at these sites. The report on this survey is attached to this fact sheet.

As Ohio's biological criteria do not apply within mixing zones, sampling was conducted to determine if the effluent resulted in rapid lethality (acute toxic conditions). Toxicity in macroinvertebrates generally shows up as severely degraded communities with biological indices reflecting Very Poor quality (ICI scores = 0-6 or narrative evaluations in the Very Poor range). Toxic impacts in macroinvertebrates often result in very low population densities and diversity, the elimination of most, if not all sensitive species, and a predominance of pollution tolerant populations. Severe toxic conditions may result in the elimination of all species.

Between the upstream and mixing zones sites, ICI scores declined from Marginally Good to Fair, and percentages of mayflies, caddisflies and tanytarsini midges (sensitive metrics) sharply declined (Figure 3 - see attachment). Conversely, the percentage of tolerant taxa increased sharply, from 16% to 81%, primarily due to an increase in Oligochaetes (i.e., sludge worms). Oligochaetes are considered tolerant to a variety of pollutants but are most commonly associated with organic enrichment and low dissolved oxygen levels.

Despite these impacts, the mixing zone community measured with artificial substrates was quite diverse (47 taxa), and included 9 mayflies and caddisflies (EPT taxa) and 12 pollution sensitive varieties. The predominance of enrichment tolerant oligochaetes, high taxa richness, and modest numbers of sensitive varieties suggest conditions over the artificial substrates were degraded but not extremely toxic. To maintain adequate current and depth over the artificial substrates, the samplers were set about 6 feet off-shore. Visually, the samplers appeared to be near the outer edge of the plume, and exposed to a mix of effluent and Mahoning River flow during the six-week sample period.

In contrast to the artificial substrates, qualitative natural substrate collections from the mixing zone showed more significant impacts. Only 9 taxa in very low densities were found despite adequate substrate and margin habitat quality (i.e, root mats and undercut banks, submerged sticks, tree limbs, etc.). Organisms were virtually absent from these habitats but similar root mats found immediately upstream supported large numbers of scuds, crayfish and damselflies. While not particularly sensitive, the abundance of these populations was obviously greater outside of the discharge influence. Inside the mixing zone, small amounts of oil were kicked up in the substrates, unnatural-looking deposits of black

muck or solids were observed along the banks, and occasional large chunks of a hard, whitish-green precipitate were found. A discarded car or truck battery was also observed.

Based on ICI scores, water quality conditions upstream from Thomas Steel have not changed significantly since 1994 (Figure 2). Community health ranged from Good in 1994 to Marginally Good in 2006, but both scores were within the range of variation for the index (± 4 ICI points). Some improvement was apparent in collections of pollution sensitive and EPT taxa as the number of total sensitive taxa doubled (from 14 to 28) and total EPT taxa increased from 11 to 17.

Mixing zone results were also similar between sampling years. ICI scores increased from 16 in 1994 to 24 in 2006 (both Fair) with the increase primarily the result of greater taxa richnes and more EPT and sensitive midge taxa on the artificial substrates. However, pollution tolerant taxa, particularly oligochaetes, continued to account for over 80% of total organisms in both 1994 and 2006 collections. Both samplers tended to reflect degraded but not extremely toxic conditions, with some improvement noted by 2006.

In contrast to the artificial substrates, qualitative natural substrate sampling revealed a stronger toxic response in both 1994 and 2006. Taxa richness (5-9) and abundance were very low during each survey and both field crews noted the effluent plume hugged the extreme left bank where the natural substrate sampling was concentrated. Given these observations, some differences between the artificial substrate and natural substrate results may be related to variation in exposure to effluent concentrations across the effluent plume; that is, the samplers appear to be exposed to lower concentrations of the effluent than the resident organisms are. These results show that a toxic zone still exists within the effluent plume.

Grab water chemical samples showed a violation of the inside mixing zone maximum statewide Water Quality Standard for total recoverable copper (68 ug/l) in one of two sample events (OAC 3745-1-07, Table 7-9). The level of copper discharged from the Dickey Run storm sewer was 182 ug/l at the time of the exceedance (08/09/06). Although OAC 3745-1-25, Table 25-1 indicates that there exists a site-specific IMZM criterion for Thomas Steel Strip, this standard is no longer technically applicable because it pre-dates the 1997 Water Quality Standard revisions; Ohio EPA did not make the appropriate changes to OAC 3745-1-25 at that time.

To observe an exceedance of the IMZM copper criterion in one of two random sample events suggests that many more such events likely occur on an annual basis. Monthly operating report data submitted to Ohio EPA by Thomas Steel Strip indicates a long-term problem with copper being discharged from the 001 outfall. Thomas Steel reported a total recoverable copper concentration of 144 ug/l (10/12/2005), which exceeds the current permit limit of 130 ug/l. Other exceedances of copper limits were reported in 2005 and 2007. Data collected by Ohio EPA during two 2005 compliance sampling inspections showed exceedances of copper limits, and elevated ammonia concentrations; the data also showed one exceedance of the free cyanide IMZM standard.

Analysis of sediment chemistry showed a lower level of total recoverable copper within the Dickey Run mixing zone sediment than upstream. This result suggest that intermittent and high levels of copper in the mixing zone water is a more likely stressor than chronic exposure to copper in sediment to explain the macroinvertebrate impacts in the shore-hugging mixing zone habitat.

Development of Water-Quality-Based Effluent Limits

All pollutants detected in the Thomas Steel effluent were evaluated by Ohio EPA in models run during 2006-07. The models evaluated whether a wasteload allocation was needed for each parameter, allocated a share of the Mahoning River load to Thomas Steel if necessary, and assessed whether the company's discharge had the reasonable potential to cause or contribute to exceedances of WQS.

Ohio EPA does not believe that the conditions of the discharge or wasteload allocation have changed appreciably since the last analysis was done. Based on this wasteload allocation, Ohio EPA included water quality-based limits for ammonia-nitrogen, chlorine, free cyanide, copper and nickel in the current permit. While water quality-based limits were also needed for mercury; however, Thomas Steel obtained a variance from the 30-day mercury limit. They showed that they could not meet this standard without installing prohibitively expensive end-of-pipe treatment. The permit requires the company to investigate sources of mercury and minimize or eliminate the discharge from any sources that they find.

Basis for Modification/ Effluent Limits

The changes in this modification are part of the settlement of Thomas Steel's permit appeal. Ohio EPA agreed to make changes in the permit based on updated information; the company agreed to accept certain permit conditions that they had initially appealed.

Changes to Chemical-specific Limits and Monitoring Requirements
Ohio EPA would remove the 30-day limits for free cyanide and residual chlorine in this modification. For free cyanide, Thomas Steel submitted information that indicates that cyanide degrades in the Mahoning River between their discharge and the WCI Steel intake downstream. This information updates Ohio EPA's wasteload allocation, which assumed that free cyanide did not degrade in the river. This initial assessment shared the available assimilative capacity between Thomas Steel and other discharges in the river segment (WCI, ArcelorMittal and the City of Warren).

Cyanide degradation in streams is sensitive to local conditions. Ohio EPA assumes that it does not degrade unless stream-specific data shows that it does. This is normally done by showing that free cyanide concentrations fall to levels below detection at a certain point in the stream. In this case, Thomas Steel showed that WCI Steel has not been detecting cyanide in their river intake. This indicates that cyanide breaks down in the river between the two discharges. Thomas Steel can be allocated a cyanide limit based only on their discharge flow and the background conditions in the Mahoning River. The new allocation shows that the 30-day allocation is greater than the allocation to protect inside-mixing-zone maximum (IMZM) water quality standards. Therefore the maximum limit to protect IMZM is more restrictive, and should be the permit limit.

The logic for removing the 30-day residual chlorine limit is the same.

Ohio EPA has agreed to reduce the monitoring frequency for chromium and lead from 1/week to 1/month. This level of data collection is needed for the probability-based model for the Mahoning River. Thomas Steel has dropped their demand that the monitoring requirements for these pollutants be removed from the permit.

All other limits and monitoring requirements for chemical-specific pollutants would remain the same in this permit modification. At Outfall 001, water quality-based limits for ammonia-nitrogen, chlorine (maximum), cyanide (maximum), copper, nickel and mercury (maximum) have been included in the permit. At Outfalls 601 and 603, all of the limits and monitoring requirements would remain the same.

These are based on federal treatment technology standards for the Iron and Steel and Metal Finishing Industries.

Under 40 CFR 122.44(a), the Director is continuing the waiver from monitoring certain pollutants listed in the effluent guidelines. This waiver applies to cadmium, lead, silver, naphthalene and tetrachloroethylene at Outfall 601. The permittee has demonstrated through sampling that these pollutants are not present in the discharge or are present only at background levels from intake water without any increase due to the activities of the discharger. A special condition pertaining to this waiver is included in the permit.

Whole Effluent Toxicity Requirements
Whole effluent toxicity (WET) is the total toxic effect of an effluent on aquatic life measured directly with a toxicity test. Acute WET measures short term effects of the effluent while chronic WET measures longer term and potentially more subtle effects of the effluent.

Water quality standards for WET are expressed in Ohio's narrative "free from" WQS rule [OAC 3745-1-04(D)]. These "free froms" are translated into toxicity units (TUs) by the associated WQS Implementation Rule (OAC 3745-2-09). Wasteload allocations can then be calculated using TUs as if they were water quality criteria.

The wasteload allocation calculations for WET are similar to those for aquatic life criteria - using the chronic toxicity unit (TU_c) and 7Q10 flow for the average and the acute toxicity unit (TU_a) and 1Q10 flow for the maximum. These values are the levels of effluent toxicity that should not cause instream toxicity during critical low-flow conditions. For Thomas Steel, the wasteload allocation values are 1.0 TU_a and 50.2 TU_c.

The chronic toxicity unit (TU_c) is defined as 100 divided by the IC_{25}:

$$TU_c = 100/IC_{25}$$

This equation applies outside the mixing zone for warmwater, modified warmwater, exceptional warmwater, coldwater, and seasonal salmonid use designations except when the following equation is more restrictive (Ceriodaphnia dubia only):

$$TU_c = 100/\text{geometric mean of NOEC and LOEC}$$

The acute toxicity unit (TU_a) is defined as 100 divided by the LC_{50} for the most sensitive test species:

$$TU_a = 100/LC_{50}$$

This equation applies outside the mixing zone for warmwater, modified warmwater, exceptional warmwater, coldwater, and seasonal salmonid use designations.

Thomas Steel submitted dilution information in 2006 to justify an acute toxicity limit of 2.5 TUa. Based on this study, Ohio EPA tentatively accepted this revision to the permit. The Agency was collecting biological data on Mahoning River communities to see if the impacts observed in 1994 had diminished in response to wastewater management changes at Thomas Steel. Ohio EPA considered the change in limits tentative until the study confirmed that toxicity was no longer present.

The 2000 biological results (Table 4) show that, while improvements have occurred, toxicity is still present along the river bank downstream of Thomas Steel's discharge. Ohio EPA issued a permit in 2008 with a lower final limit for toxicity; however, it is not clear whether the toxicity is due to the current limit not being sufficiently stringent, or whether the toxicity is due to the company's periodic non-compliance with limits (see Tables 2 and 3).

Ohio EPA's modification would keep the current toxicity limits in place, and see if the company's meeting the limit will result in the elimination of the toxic response in the near-downfield area of the river. Thomas Steel believes that the toxicity observed may: (1) have another source, or (2) be caused by chronic toxicity, which may not be a violation of WQS. To test this, we have included a study of effluent and nearfield acute toxicity to help determine whether acute or chronic toxicity is the cause of the impairment, and how much, if any, Thomas Steel's effluent is contributing to the problem.

Antidegradation

The increase in final acute toxicity limit falls under the antidegradation rule because it is an increase in an authorized discharge level. The final authorized level for acute toxicity would be raised from 1.5 acute toxicity units (TUa) to the interim limit of 2.5 TUa with this modification. The alternatives reviewed for this modification are the same as those reviewed in the 2006 modification that raised the toxicity limit from 1.0 TUa to 2.5 TUa.

The preferred alternative for this modification is to raise the final toxicity limit from 1.5 TUa to 2.5 TUa, along with the treatment changes made in 2003-4 that reduced toxicity from higher levels.

Thomas Steel and Ohio EPA looked at the possibility of regional treatment at the Warren Water Pollution Control Facility (WPCF). It is not clear whether metal treatment process (Outfall 601) could be connected to the WPCF because the discharge may have ammonia and dissolved solids loadings higher than local limits would allow. It is not feasible to connect the copper/brass wastewater line to the Warren WPCF because the company would need to build a duplicate metals treatment unit to meet federal pretreatment standards for discharges to publicly-owned treatment works.

Other alternatives identified during the last modification include:

- Reconstructing the process and wastewater systems to improve treatment and water reuse. This was projected to cost between $2.12 million and $2.96 million in 2006;
- Upgrade the copper/brass treatment to provide longer retention time (24 hours). This was projected to cost $547,000 in 2006;
- Construct supplemental pH control at Outfall 601 to reduce ammonia toxicity. This was projected to cost $25,000 in 2006;
- Construct ammonia stripping of the copper/brass wastewater. This was not costed-out in 2006 because engineering studies showed it to be insufficiently effective at removing ammonia. This process does not deal with other possible sources of toxicity;
- Closing the copper/brass plating line.

Ohio EPA's review finds that there would be no environmental benefits with the limits increase in this modification. There would not be environmental benefits lost by this action; however, there may be environmental benefits delayed, depending on the outcome of environmental studies conducted during the

remaining term of this permit. If the observed biological impact is due to Thomas Steel's toxicity limits not being strict enough, or their exceedance of 2.5 TUa, or another source of acute toxicity, the environmental benefit of reducing these sources will be delayed until the specific cause is identified and corrected. If the impact is due to chronic toxicity, there will be no change in environmental conditions in the near-field area downstream of the discharge.

Based on the review of these factors, Ohio EPA is issuing a draft modification that changes the toxicity limits until the time that the specific cause of the biological impact can be identified and, if due to an exceedance of WQS, corrected.

Other Requirements

This permit modification also contains updated Part III language, mostly related to reporting of spills and permit violations. These conditions are required of all permittees; most of the requirements are based on federal NPDES regulations applicable to all dischargers.

Figure 1. Approximate location of the Thomas Steel.

Table 2. Summary of acute toxicity test results on the Thomas Steel Outfall 001 effluent.

TEST DATE(a)	*Ceriodaphnia dubia 48 hour*						*Fathead Minnows 48 hour*					
	UP[b]	***Cc***	***LC_{50}[d]***	***%Mi***	***TUag***	***NFh***	***UPb***	***Cc***	***LC50[d]***	***%Mi***	***TUag***	***NFh***
E 02/10/04	*0*	*NR*	*46.7*	*>50*	*2.14*	*NT*	*NT*	*NT*	*NT*	*NT*	*NT*	*NT*
E 02/16/04	*NR*	*NR*	*67*	*>50*	*1.5*	*NT*	*NT*	*NT*	*NT*	*NT*	*NT*	*NT*
E 02/23/04	*NR*	*NR*	*>100*	*0*	*<1.0*	*NT*	*NT*	*NT*	*NT*	*NT*	*NT*	*NT*
E 03/01/04	*NR*	*NR*	*62.5*	*>50*	*1.6*	*NT*	*NT*	*NT*	*NT*	*NT*	*NT*	*NT*
E 04/13/04	*NR*	*NR*	*83*	*>50*	*1.2*	*NT*	*NT*	*NT*	*NT*	*NT*	*NT*	*NT*
E 04/20/04	*NR*	*NR*	*21*	*>50*	*4.8*	*NT*	*NT*	*NT*	*NT*	*NT*	*NT*	*NT*
E 04/21/04	*NR*	*NR*	*62.5*	*>50*	*1.6*	*NT*	*NT*	*NT*	*NT*	*NT*	*NT*	*NT*
E 04/27/04	*NR*	*NR*	*>100*	*0*	*<1.0*	*NT*	*NT*	*NT*	*NT*	*NT*	*NT*	*NT*
E 05/18/04	*5*	*NR*	*>100*	*35*	*0.7*	*NT*	*0*	*NR*	*>100*	*0*	*<1.0*	*NT*
E 08/10/04	*0*	*NR*	*77*	*>50*	*1.3*	*NT*	*NR*	*NR*	*>100*	*10*	*0.2*	*NT*
E 11/09/04	*NR*	*NR*	*23*	*>50*	*4.4*	*NT*	*NR*	*NR*	*>100*	*10*	*0.2*	*NT*
E 02/08/05	*NT*	*NT*	*NT*	*NT*	*NT*	*NT*	*NR*	*NR*	*>100*	*0*	*<1.0*	*NT*
E 03/13/05	*0*	*NR*	*>100*	*0*	*<1.0*	*NT*	*NT*	*NT*	*NT*	*NT*	*NT*	*NT*
E 05/17/05	*0*	*NR*	*>100*	*0*	*<1.0*	*NT*	*0*	*NR*	*>100*	*0*	*<1.0*	*NT*
O 06/14/05	*0*	*0*	*34.2*	*100*	*2.9*	*20*	*0*	*0*	*63.8*	*60*	*1.56*	*0*
E 08/09/05	*0*	*NR*	*>100*	*0*	*<1.0*	*NT*	*0*	*NR*	*>100*	*0*	*<1.0*	*NT*
E 11/29/05	*0*	*NR*	*>100*	*30*	*0.6*	*NT*	*5*	*NR*	*>100*	*0*	*<1.0*	*NT*
E 02/23/06	*45*	*I*	*I*	*I*	*I*	*NT*	*0*	*NR*	*>100*	*25*	*0.5*	*NT*
E 05/13/06	*0*	*NR*	*77*	*>50*	*1.3*	*NT*	*7.5*	*NR*	*>100*	*0*	*<1.0*	*NT*
E 08/29/06	*NT*	*NR*	*71*	*>50*	*1.4*	*NT*	*0*	*NR*	*>100*	*0*	*<1.0*	*NT*
E 09/12/06	*0*	*NR*	*36*	*>50*	*2.8*	*NT*	*0*	*NR*	*>100*	*0*	*<1.0*	*NT*
E 10/10/06	*0*	*NR*	*32*	*>50*	*3.1*	*NT*	*0*	*NR*	*>100*	*0*	*<1.0*	*NT*
E 11/07/06	*0*	*NR*	*>100*	*0*	*<1.0*	*NT*	*5*	*NR*	*>100*	*0*	*<1.0*	*NT*
E 02/06/07	*0*	*NR*	*71*	*>50*	*1.4*	*NT*	*0*	*NR*	*>100*	*0*	*<1.0*	*NT*
E 05/08/07	*0*	*NR*	*42*	*>50*	*2.4*	*NT*	*0*	*NR*	*>100*	*0*	*<1.0*	*NT*
E 08/14/07	*0*	*NR*	*>100*	*0*	*<1.0*	*NT*	*5*	*NR*	*>100*	*0*	*<1.0*	*NT*
E 11/27/07	*0*	*NR*	*48*	*>50*	*2.1*	*NT*	*0*	*NR*	*>100*	*0*	*<1.0*	*NT*
E 08/18/08	*0*	*NR*	*>100*	*0*	*<1.0*	*NT*	*0*	*NR*	*>100*	*0*	*<1.0*	*NT*
E 12/16/08	*0*	*NR*	*27*	*>50*	*3.7*	*NT*	*0*	*NR*	*>100*	*0*	*<1.0*	*NT*
E 03/10/09	*0*	*NR*	*>100*	*0*	*<1.0*	*NT*	*0*	*NR*	*>100*	*0*	*<1.0*	*NT*

[a] O = EPA test; E = entity test
[b] UP = upstream control water
[c] C = laboratory water control
[d] LC_{50} = median lethal concentration
[e] EC_{50} = median effects concentration
NT = not tested

[f] %A = percent adversely affected in 100% effluent
[g] %M = percent mortality in 100% effluent
[h] TUa = acute toxicity units
[i] NF = near field sample in the Mahoning River
ND = not determined

Table 3. Summary of chronic toxicity test results on the Thomas Steel Outfall 001effluent.

Test Date (a)	*Ceriodaphnia dubia 7-Day*											*Fathead Minnows 7-Day*				
	UP[b]	*Cc*	*IC_{25}*[d]	*TUc*[e]	*Survival*			*Reproduction*			*FFi*	*UPb*	*Cc*	*IC25*[d]	*TUc*[e]	*FFi*
					LOECf	*NOECg*	*TUc*[h]	*LOECf*	*NOECg*	*TUc*[h]						
E 05/18/04	*NR*	*NR*	*NR*	*5.6*	*NR*	*NR*	*5.6*	*NR*	*NR*	*5.6*	*NT*	*NR*	*NR*	*>100*	*≤1.0*	*NT*
E 08/10/04	*NR*	*NR*	*NR*	*5.6*	*NR*	*NR*	*5.6*	*NR*	*NR*	*5.6*	*NT*	*NR*	*NR*	*>100*	*≤1.0*	*NT*
E 11/09/04	*NR*	*NR*	*NR*	*20.8*	*NR*	*NR*	*20.8*	*NR*	*NR*	*20.8*	*NT*	*NR*	*NR*	*>100*	*≤1.0*	*NT*
E 03/13/05	*NR*	*NR*	*NR*	*1.4*	*NR*	*NR*	*1.4*	*NR*	*NR*	*1.4*	*NT*	*NR*	*NR*	*>100*	*≤1.0*	*NT*
E 05/17/05	*NR*	*NR*	*NR*	*28.6*	*NR*	*NR*	*28.6*	*NR*	*NR*	*28.6*	*NT*	*NR*	*NR*	*>100*	*≤1.0*	*NT*
E 08/09/05	*0*	*NR*	*NR*	*2.8*	*NR*	*NR*	*2.8*	*NR*	*NR*	*2.8*	*NT*	*15*	*NR*	*>100*	*≤1.0*	*NT*
E 11/29/05	*0*	*NR*	*NR*	*1.5*	*NR*	*NR*	*1.5*	*NR*	*NR*	*1.5*	*NT*	*0*	*NR*	*>100*	*≤1.0*	*NT*
E 02/23/06	*80*	*NR*	*I*	*I*	*I*	*I*	*I*	*I*	*I*	*I*	*NT*	*10*	*NR*	*>100*	*1.4*	*NT*
E 05/16/06	*0*	*NR*	*NR*	*11.4*	*NR*	*NR*	*11.4*	*NR*	*NR*	*11.4*	*NT*	*10*	*NR*	*>100*	*≤1.0*	*NT*
E 08/29/06	*NT*	*NT*	*NT*	*NT*	*NT*	*NT*	*NT*	*NT*	*NT*	*NT*	*NT*	*0*	*NR*	*>100*	*≤1.0*	*NT*
E 09/12/06	*0*	*NR*	*NR*	*11.4*	*NR*	*NR*	*11.4*	*NR*	*NR*	*11.4*	*NT*	*0*	*NR*	*>100*	*≤1.0*	*NT*
E 10/10/06	*0*	*NR*	*NR*	*50*	*NR*	*NR*	*50*	*NR*	*NR*	*50*	*NT*	*27*	*NR*	*>100*	*1.4*	*NT*
E 11/07/06	*0*	*NR*	*NR*	*11.4*	*NR*	*NR*	*11.4*	*NR*	*NR*	*11.4*	*NT*	*17*	*NR*	*>100*	*1.4*	*NT*
E 02/06/07	*0*	*NR*	*NR*	*11.4*	*NR*	*NR*	*11.4*	*NR*	*NR*	*11.4*	*NT*	*2*	*NR*	*>100*	*≤1.0*	*NT*
E 05/08/07	*0*	*NR*	*NR*	*28.2*	*NR*	*NR*	*28.2*	*NR*	*NR*	*28.2*	*NT*	*30*	*NR*	*>100*	*≤1.0*	*NT*
E 08/14/07	*0*	*NR*	*NR*	*1.4*	*NR*	*NR*	*1.4*	*NR*	*NR*	*1.4*	*NT*	*NR*	*NR*	*>100*	*≤1.0*	*NT*
E 11/27/07	*0*	*NR*	*NR*	*2.8*	*NR*	*NR*	*2.8*	*NR*	*NR*	*2.8*	*NT*	*8*	*NR*	*>100*	*≤1.0*	*NT*
E 08/18/08	*0*	*NR*	*NR*	*1.4*	*NR*	*NR*	*1.4*	*NR*	*NR*	*1.4*	*NT*	*12*	*NR*	*>100*	*≤1.0*	*NT*
E 12/16/08	*0*	*NR*	*NR*	*5.6*	*NR*	*NR*	*5.6*	*NR*	*NR*	*5.6*	*NT*	*5*	*NR*	*>100*	*≤1.0*	*NT*
E 03/10/09	*0*	*NR*	*NR*	*1.4*	*NR*	*NR*	*1.4*	*NR*	*NR*	*1.4*	*NT*	*0*	*NR*	*>100*	*≤1.0*	*NT*

[a]O = EPA test; E = entity test

[h]TU_c = chronic toxicity units based on LOEC and NOEC

[b]UP = upstream control water
[c]C = laboratory water control
[d]IC_{25} = inhibition concentration twenty-five
[e]TU_c = chronic toxicity units based on IC_{25}
[f]LOEC = lowest observed effects concentration
[g]NOEC = no observed effects concentration
[i]FF = far-field effect
[j]STU_c = TUc based on LOEC and NOEC for survival
[k]GTU_c = TUc based on LOEC and NOEC for growth
BD = below detection
NT = not tested

Table 4. Summary of the aquatic life use attainment status for the warmwater habitat use designation in Mahoning River based on data collected by the Ohio EPA from July-September 2006 and 1994.

RIVER MILE (Year)		Density (3/ft2)	Quant. Taxa	Qual. Taxa	Qual. EPT[a]	Total Taxa	Sensitive Taxa (Qual.)	ICI	Narrative Evaluation
39.1	(2006)	527	33	44	11	61	14	30[ns]	Marginally Good
39.1	(1994)	560	30	35	7	51	7	34	Good
39.06	*(2006)*	*519*	*47*	*9*	*1*	*52*	*1*	*24*	*Fair*
39.06	*(1994)*	*378*	*24*	*5*	*0*	*28*	*0*	*16*	*Fair*
38.3	(2006)	476	37	48	14	63	16	30[ns]	Marginally Good
38.2	(1994)	300	34	31	6	51	6	26*	Fair

Ecoregion Biocriteria: Invertebrate Community Index (ICI)

Erie-Ontario Lake Plain (EOLP)		
WWH	EWH	MWH
34	46	22

Notes:
a EPT = total Ephemoptera (mayflies), Plecoptera (stoneflies) and Trichoptera (caddisflies) taxa richness.
ns Nonsignificant departure from ecoregional biocriteria ($\leq$4 ICI units)
* Significant departure from ecoregion biocriteria (>4 ICI units)

Table 5. Final effluent limits and monitoring requirements for Thomas Steel Strip outfall 3IC00056001 and the basis for their recommendation.

		Effluent Limits				
		Concentration		Loading (kg/day)[a]		
Parameter	Units	30 Day Average	Daily Maximum	30 Day Average	Daily Maximum	Basis[b]
Flow	MGD	- - - - - - - - - - - -	Monitor	- - - - - - - - - - - - - - -		M[c]
Dissolved Solids	mg/l	- - - - - - - - - - - -	Monitor	- - - - - - - - - - - - - - -		M[c]
Suspended Solids	mg/l					
Summer		- - - - - - - - - - - -	Monitor	- - - - - - - - - - - - - - -		M[c]
Winter		- - - - - - - - - - - -	Monitor	- - - - - - - - - - - - - - -		M[c]
Ammonia-N	mg/l					
Summer		--	20.1	--	137	WLA/IMZM
Winter		--	25.2	--	172	WLA/IMZM
Oil and Grease	mg/l					
Summer		10	20	64	128	ABS/EP
Winter		10	20	78	156	ABS/EP
pH	S.U.	- - - - - - - - - - - - -	6.5 to 9.5	- - - - - - - - - - - - -		ABS/EP
Chlorine Residual	mg/l	--	0.035	--	0.24	WLA
Cyanide, Free	mg/l	--	0.092	--	0.63	WLA/IMZM
Boron, T. R.	µg/l	- - - - - - - - - - - -	Monitor	- - - - - - - - - - - - - - -		M[c]
Cadmium, T. R.	µg/l	- - - - - - - - - - - -	Monitor	- - - - - - - - - - - - - - -		M[c]
Chromium, T. R.	µg/l	- - - - - - - - - - - -	Monitor	- - - - - - - - - - - - - - -		M[c]
Hex. Chromium (Dissolved)	µg/l	- - - - - - - - - - - -	Monitor	- - - - - - - - - - - - - - -		M[c]
Copper, T. R.	µg/l	--	130	--	0.74	WLA
Copper, Diss.	µg/l	--	57	--	--	WLA/IMZM
Lead, T. R.	µg/l	- - - - - - - - - - - -	Monitor	- - - - - - - - - - - - - - -		M[c]
Mercury, T.	ng/l	44	1700	0.00029	0.012	VAR, WLA
Nickel, T. R.	µg/l	330	1300	1.87	7.38	WLA
Zinc, T. R.	µg/l	- - - - - - - - - - - -	Monitor	- - - - - - - - - - - - - - -		M[c]
Chloroform	µg/l	- - - - - - - - - - - -	Monitor	- - - - - - - - - - - - - - -		M[c]
Whole Effluent Toxicity						
Acute	TUa	--	2.5	--	--	WLA/WET
Chronic	TUc	- - - - - - - -	Monitor (w/o trigger)	- - - - - - - - - -		WET

Table 5. Con't.

[a] Effluent loadings based on discharge flows of:

1.69 MGD summer TSS and oil&grease limits;
2.05 MGD winter TSS and oil&grease limits;
1.80 MGD ammonia, chlorine, cyanide and mercury limits;
1.5 MGD copper and nickel limits.

[b] Definitions: ABS = Antibacksliding Rule (OAC 3745-33-05(E) and 40 CFR Part 122.44(l)); EP = Existing Permit; M = Monitoring; RP = Reasonable Potential for requiring water quality-based effluent limits and monitoring requirements in NPDES permits (3745-33-07(A)); VAR = Mercury variance granted under OAC 3745-33-07(D)(10); WET = Whole Effluent Toxicity (OAC 3745-33-07(B)) ; WLA = Wasteload Allocation procedures (OAC 3745-2); WLA/IMZM = Wasteload Allocation limited by Inside Mixing Zone Maximum; WQS = Ohio Water Quality Standards (OAC 3745-1).

[c] Monitoring of flow and other indicator parameters is specified to assist in the evaluation of effluent quality and treatment plant performance.

Table 6. Final effluent limits and monitoring requirements for Thomas Steel Strip outfalls 3IC00056601 and 3IC00056603 and the basis for their recommendation.

		Effluent Limits				
		Concentration		Loading (kg/day)[a]		
Parameter	Units	30 Day Average	Daily Maximum	30 Day Average	Daily Maximum	Basis[b]
Outfall 601						
Flow	MGD	- - - - - - - - - - - - Monitor - - - - - - - - - - - - - - - -				M[c]
Suspended Solids	mg/l	30.8	59.6	37.9	73.5	BCT
Oil and Grease	mg/l	25.5	51.1	31.4	62.9	BCT
pH	S.U.	- - - - - - - - - - - - Monitor - - - - - - - - - - - - - - - -				M[c]
Cadmium, T. R.	µg/l	252	670	0.310	0.824	BAT[d]
Chromium, T. R.	µg/l	1660	2700	2.046	3.31	BAT
Copper, T. R.	µg/l	845	1386	1.03	1.69	ABS/EP
Lead, T. R.	µg/l	420	680	0.519	0.838	BAT[d]
Nickel, T. R.	µg/l	2320	3880	2.85	4.76	BAT
Silver, T. R.	µg/l	233	417	0.287	0.521	BAT[d]
Zinc, T. R.	µg/l	1440	2550	1.77	3.13	BAT
Naphthalene	µg/l	--	--	--	0.0042	BAT[d]
Tetrachloroethylene	µg/l	--	--	--	0.0028	BAT[d]
Tot. Toxic Organics	µg/l	--	2070	--	2.55	BAT
Outfall 603						
Flow	MGD	- - - - - - - - - - - - Monitor - - - - - - - - - - - - - - - -				M[c]
Cyanide, Amenable to Chlorination	mg/l	0.32	0.86	--	--	BAT

[a] Effluent concentrations are based on average design discharge flow of 0.325 MGD.

[b] Definitions: ABS = Antibacksliding Rule (OAC 3745-33-05(E) and 40 CFR Part 122.44(l)); BAT = Best Available Control Technology Currently Available, 40 CFR Part 420, Iron and Steel Category, and 40 CFR 433, Metal Finishing Category; BCT = Best Conventional Pollutant Control Technology, 40 CFR Part 420, Iron and Steel Category, and 40 CFR Part 433, Metal Finishing Category; EP = Existing Permit; M = Monitoring.

[c] Monitoring of flow and other indicator parameters is specified to assist in the evaluation of effluent quality and treatment plant performance.

[d] The monitoring requirements for these categorical parameters have been waived by the director under 40 CFR 122.44(a)(2).

National Pollutant Discharge Elimination System (NPDES) Permit Program

F A C T S H E E T

Regarding an NPDES Permit To Discharge to Waters of the State of Ohio
for **Thomas Steel Strip Corporation**

Public Notice No.: 08-03-004
Public Notice Date: March 4, 2008
Comment Period Ends: May 4, 2008

OEPA Permit No.: **3IC00056*ID**
Application No.: **OH0011363**

Name and Address of Applicant:

Thomas Steel Strip Corporation
Delaware Avenue, N.W.
Warren, Ohio 44485

Name and Address of Facility Where Discharge Occurs:

Thomas Steel Strip Corporation
Delaware Avenue, N.W.
Warren, Ohio 44485
Trumbull County

Receiving Water: **Mahoning River via Dickey Run storm sewer**

Subsequent Stream Network: **Beaver River to Ohio River**

Introduction

Development of a Fact Sheet for NPDES permits is required by Title 40 of the Code of Federal Regulations, Section 124.8 and 124.56. This document fulfills the requirements established in those regulations by providing the information necessary to inform the public of actions proposed by the Ohio Environmental Protection Agency, as well as the methods by which the public can participate in the process of finalizing those actions.

This Fact Sheet is prepared in order to document the technical basis and risk management decisions that are considered in the determination of water quality based NPDES Permit effluent limitations. The technical basis for the Fact Sheet may consist of evaluations of promulgated effluent guidelines and other treatment-technology based standards, existing effluent quality, instream biological, chemical and physical conditions, and the allocations of pollutants to meet Ohio Water Quality Standards. This Fact Sheet details the discretionary decision-making process empowered to the director by the Clean Water Act and Ohio Water Pollution Control Law (ORC 6111). Decisions to award variances to Water Quality Standards or promulgated effluent guidelines for economic or technological reasons will also be justified in the Fact Sheet where necessary.

Effluent limits based on available treatment technologies are required by Section 301(b) of the Clean Water Act. Many of these have already been established by U.S. EPA in the effluent guideline regulations (a.k.a. categorical regulations) for industry categories in 40 CFR Parts 405-499. Technology-

based regulations for publicly-owned treatment works are listed in the Secondary Treatment Regulations (40 CFR Part 133). If regulations have not been established for a category of dischargers, the director may establish technology-based limits based on best professional judgment (BPJ).

Ohio EPA reviews the need for water-quality-based limits on a pollutant-by-pollutant basis. Wasteload allocations are used to develop these limits based on the pollutants that have been detected in the discharge, and the receiving water's assimilative capacity. The assimilative capacity depends on the flow in the water receiving the discharge, and the concentration of the pollutant upstream. The greater the upstream flow, and the lower the upstream concentration, the greater the assimilative capacity is. Assimilative capacity may represent dilution (as in allocations for metals), or it may also incorporate the break-down of pollutants in the receiving water (as in allocations for oxygen-demanding materials).

The need for water-quality-based limits is determined by comparing the wasteload allocation for a pollutant to a measure of the effluent quality. The measure of effluent quality is called PEQ - Projected Effluent Quality. This is a statistical measure of the average and maximum effluent values for a pollutant. As with any statistical method, the more data that exists for a given pollutant, the more likely that PEQ will match the actual observed data. If there is a small data set for a given pollutant, the highest measured value is multiplied by a statistical factor to obtain a PEQ; for example if only one sample exists, the factor is 6.2, for two samples - 3.8, for three samples - 3.0. The factors continue to decline as samples sizes increase. These factors are intended to account for effluent variability, but if the pollutant concentrations are fairly constant, these factors may make PEQ appear larger than it would be shown to be if more sample results existed.

Summary of Permit Conditions

Outfall 001 limits for suspended solids, oil&grease, pH and total recoverable copper are proposed to continue from the current permit. The permit would add a limit for dissolved copper to ensure that all water quality standards are met.

New or lower water-quality-based limits are needed for ammonia-nitrogen, residual chlorine, free cyanide, mercury and nickel because these pollutants have the reasonable potential to contribute to exceedances of WQS. Limits for chlorine, cyanide and nickel are based on the wasteload allocation; ammonia limits are based on inside-mixing-zone maximum WQS; mercury limits are based on the mercury variance application submitted by Thomas Steel.

Current permit limits for lead are being removed because effluent data shows that they no longer have the reasonable potential to contribute to exceedances of water quality standards.

Current monitoring requirements for aluminum and selenium are being removed from the permit because these parameters do not have the reasonable potential to contribute to WQS exceedances, and are not commonly detected in the outfall 001 effluent.

The acute toxicity limit is being lowered from 2.5 TUa to 1.5 TUa, based on Ohio EPA's 2006 field survey data. The data did not show a sufficient change from the 1994 results to conclude that rapidly lethal conditions had abated in near-field areas of the Mahoning River. The 1.5 TUa limit reflects dilution observed in the Dickey Run storm sewer, based on the company's dilution study.

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Procedures for Participation in the Formulation of Final Determinations

The draft action shall be issued as a final action unless the Director revises the draft after consideration of the record of a public meeting or written comments, or upon disapproval by the Administrator of the U.S. Environmental Protection Agency.

Within thirty days of the date of the Public Notice, any person may request or petition for a public meeting for presentation of evidence, statements or opinions. The purpose of the public meeting is to obtain additional evidence. Statements concerning the issues raised by the party requesting the meeting are invited. Evidence may be presented by the applicant, the state, and other parties, and following presentation of such evidence other interested persons may present testimony of facts or statements of opinion.

Requests for public meetings shall be in writing and shall state the action of the Director objected to, the questions to be considered, and the reasons the action is contested. Such requests should be addressed to:

Legal Records Section
Ohio Environmental Protection Agency
P.O. Box 1049
Columbus, Ohio 43216-1049

Interested persons are invited to submit written comments upon the discharge permit. Comments should be submitted in person or by mail no later than 30 days after the date of this Public Notice. Deliver or mail all comments to:

Ohio Environmental Protection Agency
Attention: Division of Surface Water
Permits and Compliance Section
P.O. Box 1049
Columbus, Ohio 43216-1049

The OEPA permit number and Public Notice numbers should appear on each page of any submitted comments. All comments received no later than 30 days after the date of the Public Notice will be considered.

Citizens may conduct file reviews regarding specific companies or sites. Appointments are necessary to conduct file reviews, because requests to review files have increased dramatically in recent years. The first 250 pages copied are free. For requests to copy more than 250 pages, there is a five-cent charge for each page copied. Payment is required by check or money order, made payable to Treasurer State of Ohio.

Location of Discharge/Receiving Water Use Classification

Thomas Steel Strip discharges to Mahoning River through the Dickey Run storm sewer at River Mile (RM) 39.06. The approximate location of the facility is shown in Figure 1.

This segment of the Mahoning River is described by Ohio EPA River Code: 18-001, USEPA River Reach #: 05030103-007, County: Trumbull, Ecoregion: Erie-Ontario Lake Plains. The Mahoning River has the following designated uses: Warmwater Habitat (WWH); Agricultural Water Supply (AWS); Industrial Water Supply (IWS); and Primary Contact Recreation (PCR).

Use designations define the goals and expectations of a waterbody. These goals are set for aquatic life protection, recreation use and water supply use, and are defined in the Ohio WQS (OAC 3745-1-07). The use designations for individual waterbodies are listed in rules -08 through -32 of the Ohio WQS. Once the goals are set, numeric water quality standards are developed to protect these uses. Different uses have different water quality criteria.

Use designations for aquatic life protection include habitats for coldwater fish and macroinvertebrates, warmwater aquatic life and waters with exceptional communities of warmwater organisms. These uses all meet the goals of the federal Clean Water Act. Ohio WQS also include aquatic life use designations for waterbodies which can not meet the Clean Water Act goals because of human-caused conditions that can not be remedied without causing fundamental changes to land use and widespread economic impact. The dredging and clearing of some small streams to support agricultural or urban drainage is the most common of these conditions. These streams are given Modified Warmwater or Limited Resource Water designations.

Recreation uses are defined by the depth of the waterbody and the potential for wading or swimming. Uses are defined for bathing waters, swimming/canoeing (Primary Contact) and wading only (Secondary Contact - generally waters too shallow for swimming or canoeing).

Water supply uses are defined by the actual or potential use of the waterbody. Public Water Supply designations apply near existing water intakes so that waters are safe to drink with standard treatment. Most other waters are designated for agricultural and industrial water supply.

The Lower Mahoning River study area is shown in Figure 2.

Facility Description

Thomas Steel Strip manufactures cold-reduced steel strip, some of which is electroplated with nickel, copper, brass, or a nickel-zinc alloy. Production is estimated at 512 tons per day. Processes include pickling, cold rolling, annealing, temper rolling, slitting, and electroplating. The process operations are categorized under the Standard Industrial Classification (SIC) Code 3471, “Electroplating Cold Rolled Steel Strip” and SIC Code 3316, “Cold Rolled Steel Strip.” Process wastewaters from these operations are regulated under Federal Effluent Guidelines 40 CFR Parts 420.102 and 420.103 (Iron and Steel Manufacturing) and CFR Parts 433.13 and 433.14 (Metal Finishing).

Description of Existing Discharge

Table 1 shows the monitored discharges at Thomas Steel Strip, with a summary of treatment:

Table 1. Description of Thomas Steel Strip Outfalls

Outfall #	Type of Wastewater	Treatment Used	Discharge Point	Avg. Discharge (in MGD)
001	- Stormwater - Noncontact cooling water - Process wastewater	- Sedimentation	Mahoning River via storm sewer	1.32
601	- Electroplating rinse waters - Pretreated chromium wastewater - Pretreated cyanide wastewater - Pretreated cold rolling wastewater	- Coagulation - Neutralization - Chemical precipitation - Flocculation - Pressure filtration (solids) - Heat drying (solids)	Outfall 001	0.38
603	- Cyanide-bearing wastewater	- Chemical oxidation - Chemical reduction	Outfall 601 treatment	0.008

The draft permit contains monitoring and limits at internal stations 601 and 603 . Effluent guideline limits are applied at these outfalls to ensure that these treatment standards are met prior to combining with other wastestreams. If monitoring was not done at this location, it would not be possible to verify compliance with these standards due to dilution. Federal rules [40 CFR 125.3(f)] prohibit attaining these standards by dilution.

Table 2 presents a summary of analytical results for outfall 001 effluent samples compiled from the NPDES application and from bioassay tests done by Ohio EPA. The monthly average PEQ_{avg} and daily maximum PEQ_{max} decision criteria are also included on this table.

Table 3 presents a summary of unaltered monthly operation report data for the period January 2002 to February 2007 for Thomas Steel Strip as well as current permit limits, and monthly average PEQ_{avg} and daily maximum PEQ_{max} values.

Tables 4 and 5 present results from acute and chronic bioassay tests conducted on the final discharge. Pimephales promelas (fathead minnows), and Ceriodaphnia dubia (water flea) were the test organisms.

Receiving Water Quality / Environmental Hazard Assessment

An assessment of the impact of a permitted point source on the immediate receiving waters includes an evaluation of the available chemical/physical[1], biological[2], and habitat data which have been collected by Ohio EPA pursuant to the Five-Year Basin Approach for Monitoring and NPDES Reissuance. Other data may be used provided it was collected in accordance with Ohio EPA methods and protocols as specified by the Ohio Water Quality Standards and Ohio EPA guidance documents. Other information which may be evaluated includes, but is not limited to:

- NPDES permittee self-monitoring data;
- Effluent and mixing zone bioassays conducted by Ohio EPA, the permittee, or U.S. EPA.

In evaluating this data, Ohio EPA attempts to link environmental stresses and measured pollutant exposure to the health and diversity of biological communities. Stresses can include pollutant discharges (permitted and unpermitted), land use effects, and habitat modifications. Indicators of exposure to these stresses include whole effluent toxicity tests, fish tissue chemical data, and fish health biomarkers (for example, fish blood tests).

Use attainment is a term which describes the degree to which environmental indicators are either above or below criteria specified by the Ohio Water Quality Standards (WQS; Ohio Administrative Code 3745-1). Assessing use attainment status for aquatic life uses primarily relies on the Ohio EPA biological criteria (OAC 3745-1-07; Table 7-15). These criteria apply to rivers and streams outside of mixing zones. Numerical biological criteria are based on measuring several characteristics of the fish and macroinvertebrate communities; these characteristics are combined into multimetric biological indices including the Index of Biotic Integrity (IBI) and modified Index of Well-Being (MIwb), which indicate the response of the fish community, and the Invertebrate Community Index (ICI), which indicates the response of the macroinvertebrate community. Numerical criteria are broken down by ecoregion, use designation, and stream or river size. Ohio has five ecoregions defined by common topography, land use, potential vegetation and soil type.

Three attainment status results are possible at each sampling location -full, partial, or non-attainment. Full attainment means that all of the applicable indices meet the biocriteria. Partial attainment means that one or more of the applicable indices meet the biocriteria or one of the organism groups reflects poor or very poor performance. An aquatic life use attainment table (see Table _) is constructed based on the sampling results and is arranged from upstream to downstream and includes the sampling locations indicated by river mile, the applicable biological indices, the use attainment status (*i.e.*, full, partial, or non), the Qualitative Habitat Evaluation Index (QHEI), and comments and observations for each sampling location.

[1] water column, effluent, and sediment chemistry, flows
[2] fish and macroinvertebrate assemblages

Thomas Steel Strip Corporation
Historical data (from 1994) show that this river segment did not meet the designated warmwater habitat aquatic life use. Ohio EPA believes that this non-attainment continues to exist, based on limited biological sampling from 2002 and 2003, along with historical chemical data on stream sediments and recent fish tissue chemistry.
The summary sheet from Ohio's 2006 Integrated Water Quality Monitoring and Assessment Report is attached to this fact sheet. The complete Integrated Report can be found on the Agency website at:

http://www.epa.state.oh.us/dsw/tmdl/2006IntReport/2006OhioIntegratedReport.html.

Since that report was issued, Ohio EPA conducted a macroinvertebrate survey to check previous conclusions that the Thomas Steel contributed to toxicity in areas of the Mahoning River near the Dickey Run discharge. Sampling conducted in 2006 included upstream, mixing zone and downstream results that duplicated sites sampled during the 1994 Mahoning River survey (Summit Street - RM 39.1, the Thomas Steel mixing zone - RM 39.06, and at Market Street (RM 38.3)). Ohio EPA sampled macroinvertebrates, water, and stream sediments at these sites. The report on this survey is attached to this fact sheet.

As Ohio's biological criteria do not apply within mixing zones, sampling was conducted to determine if the effluent resulted in rapid lethality (acute toxic conditions). Toxicity in macroinvertebrates generally shows up as severely degraded communities with biological indices reflecting Very Poor quality (ICI scores = 0-6 or narrative evaluations in the Very Poor range). Toxic impacts in macroinvertebrates often result in very low population densities and diversity, the elimination of most, if not all sensitive species, and a predominance of pollution tolerant populations. Severe toxic conditions may result in the elimination of all species.

Between the upstream and mixing zones sites, ICI scores declined from Marginally Good to Fair, and percentages of mayflies, caddisflies and tanytarsini midges (sensitive metrics) sharply declined (Figure 3 - see attachment). Conversely, the percentage of tolerant taxa increased sharply, from 16% to 81%, primarily due to an increase in Oligochaetes (i.e., sludge worms). Oligochaetes are considered tolerant to a variety of pollutants but are most commonly associated with organic enrichment and low dissolved oxygen levels.

Despite these impacts, the mixing zone community measured with artificial substrates was quite diverse (47 taxa), and included 9 mayflies and caddisflies (EPT taxa) and 12 pollution sensitive varieties. The predominance of enrichment tolerant oligochaetes, high taxa richness, and modest numbers of sensitive varieties suggest conditions over the artificial substrates were degraded but not extremely toxic. To maintain adequate current and depth over the artificial substrates, the samplers were set about 6 feet off-shore. Visually, the samplers appeared to be near the outer edge of the plume, and exposed to a mix of effluent and Mahoning River flow during the six-week sample period.

In contrast to the artificial substrates, qualitative natural substrate collections from the mixing zone showed more significant impacts. Only 9 taxa in very low densities were found despite adequate substrate and margin habitat quality (i.e, root mats and undercut banks, submerged sticks, tree limbs, etc.). Organisms were virtually absent from these habitats but similar root mats found immediately upstream supported large numbers of scuds, crayfish and damselflies. While not particularly sensitive, the abundance of these populations was obviously greater outside of the discharge influence. Inside the mixing zone, small amounts of oil were kicked up in the substrates, unnatural-looking deposits of black muck or solids were observed along the banks, and occasional large chunks of a hard, whitish-green precipitate were found. A discarded car or truck battery was also observed.

Based on ICI scores, water quality conditions upstream from Thomas Steel have not changed significantly since 1994 (Figure 2). Community health ranged from Good in 1994 to Marginally Good in 2006, but both scores were within the range of variation for the index ($\pm$ 4 ICI points). Some

improvement was apparent in collections of pollution sensitive and EPT taxa as the number of total sensitive taxa doubled (from 14 to 28) and total EPT taxa increased from 11 to 17.

Mixing zone results were also similar between sampling years. ICI scores increased from 16 in 1994 to 24 in 2006 (both Fair) with the increase primarily the result of greater taxa richnes and more EPT and sensitive midge taxa on the artificial substrates. However, pollution tolerant taxa, particularly oligochaetes, continued to account for over 80% of total organisms in both 1994 and 2006 collections. Both samplers tended to reflect degraded but not extremely toxic conditions, with some improvement noted by 2006.

In contrast to the artificial substrates, qualitative natural substrate sampling revealed a stronger toxic response in both 1994 and 2006. Taxa richness (5-9) and abundance were very low during each survey and both field crews noted the effluent plume hugged the extreme left bank where the natural substrate sampling was concentrated. Given these observations, some differences between the artificial substrate and natural substrate results may be related to variation in exposure to effluent concentrations across the effluent plume; that is, the samplers appear to be exposed to lower concentrations of the effluent than the resident organisms are. These results show that a toxic zone still exists within the effluent plume.

Grab water chemical samples showed a violation of the inside mixing zone maximum statewide Water Quality Standard for total recoverable copper (68 ug/l) in one of two sample events (OAC 3745-1-07, Table 7-9). The level of copper discharged from the Dickey Run storm sewer was 182 ug/l at the time of the exceedance (08/09/06). Although OAC 3745-1-25, Table 25-1 indicates that there exists a site-specific IMZM criterion for Thomas Steel Strip, this standard is no longer technically applicable because it pre-dates the 1997 Water Quality Standard revisions; Ohio EPA did not make the appropriate changes to OAC 3745-1-25 at that time.

To observe an exceedance of the IMZM copper criterion in one of two random sample events suggests that many more such events likely occur on an annual basis. Monthly operating report data submitted to Ohio EPA by Thomas Steel Strip indicates a long-term problem with copper being discharged from the 001 outfall. Thomas Steel reported a total recoverable copper concentration of 144 ug/l (10/12/2005), which exceeds the current permit limit of 130 ug/l. Other exceedances of copper limits were reported in 2005 and 2007. Data collected by Ohio EPA during two 2005 compliance sampling inspections showed exceedances of copper limits, and elevated ammonia concentrations; the data also showed one exceedance of the free cyanide IMZM standard.

Analysis of sediment chemistry showed a lower level of total recoverable copper within the Dickey Run mixing zone sediment than upstream. This result suggest that intermittent and high levels of copper in the mixing zone water is a more likely stressor than chronic exposure to copper in sediment to explain the macroinvertebrate impacts in the shore-hugging mixing zone habitat.

Development of Water-Quality-Based Effluent Limits

Determining appropriate effluent concentrations is a multiple step process in which parameters are identified as likely to be discharged by a facility, evaluated with respect to Ohio water quality criteria, and examined to determine the likelihood that the existing effluent could violate the calculated limits. In addition, antidegradation and whole effluent toxicity issues must be addressed.

As in past modeling studies, all facilities discharging to the Mahoning River mainstem between the Leavittsburg dam and the Ohio-Pennsylvania boundary are considered interactive and are included in the wasteload allocation (WLA). The WLA contains a total of 24 outfalls from 6 municipal WWTPs and 7 industrial facilities, as follows:

Warren Steel Holdings (CSC Industries)	Thomas Steel Strip
Warren Consolidated Industries	ISG (Mittal) Steel
Warren WWTP	Reactive Metals Inc.
Orion Power Midwest, Niles Plant	Niles WWTP
McDonald Steel	Campbell WWTP
Youngstown WWTP	Lowellville WWTP
Struthers WWTP	

Four dischargers located on tributaries are allocated separately from the mainstem discharges: Meander Creek WWTP (Meander Creek), Girard WWTP (Little Squaw Creek), Mosquito Creek WWTP (Mosquito Creek), and Boardman WWTP (Mill Creek). Travel time to and distance from the Mahoning River are considered large enough that, for modeling purposes, the effluents from the respective treatment plants are considered non-interactive with the direct dischargers to the Mahoning. Effluents from these four treatment plants were allocated to meet water quality standards for the conditions, habitat, and use designation for their particular receiving waters and separate Permit Support Documents were prepared for each facility. Monitoring was conducted downstream of these dischargers or at the mouths of these tributaries, however, for inputs into the Mahoning River mainstem model.

Parameter Selection

Effluent data for Thomas Steel Strip were used to determine what parameters should undergo wasteload allocation. The sources of effluent data are as follows:

Self-monitoring data (LEAPS)	January 2002 through June 2006
Ohio EPA data (compliance, survey)	June 2005
Form 2.C. application data	2006

The effluent data were checked for outliers and the following values were eliminated from the data set: free cyanide, 202000. and 172000. µg/L, and halomethanes, 320. and 107. µg/L. The average and maximum projected effluent quality (PEQ) values are presented in Table 3. For a summary of the screening results, refer to the parameter groupings at the end of this section.

Water Quality Standards

Ohio water quality standards (WQS) were used for all parameters except for chronic cadmium and chronic lead. The Mahoning River enters Pennsylvania at about river mile (RM) 11.43, and Pennsylvania WQS must be met at that point. The Pennsylvania Aquatic Life criteria and Human Health criteria were met at the state line for all other parameters (metals and organics).

Flows in the Mahoning River

Flows in the Mahoning River are contributed by a series of reservoirs in the headwaters and on Mosquito Creek, controlled and mostly owned by the U.S. Army Corps of Engineers. Constructed several decades ago to provide adequate flow for the steel industry of the Mahoning River valley, the reservoirs are operated on a schedule to maintain specific seasonal flows at Leavittsburg and Youngstown. The operation of the reservoir system is discussed at length in earlier USEPA Mahoning River studies (Amendola et al., 1977; Schregardus and Amendola, 1984).

Modeling Approach and Wasteload Allocations

Appropriate effluent concentrations for dischargers to the Mahoning River were determined using two models: a Monte Carlo model for the six commonly allocated metals (cadmium, chromium (total), copper, lead, nickel, and zinc) and the conventional Ohio EPA conservative parameter model (CONSWLA) for all other parameters. The models and their applications are discussed in the sections that follow and model inputs are presented.

Allocations are developed using a percentage of stream design flow (as specified in Table 5), and allocations cannot exceed the Inside Mixing Zone Maximum criteria. The data used in the WLAs are listed in Tables 4 and 5. The wasteload allocation results to maintain all applicable criteria are presented in Table 6.

Dissolved Metals Translators

A dissolved metals translator (DMT) is the factor used to convert a dissolved metal aquatic life criterion to an effective total recoverable aquatic life criterion with which a total recoverable aquatic life allocation can be calculated as required in the NPDES permit process. Currently, a DMT is based on site- or area-specific field data; each field data sample consists of a total recoverable measurement paired with a dissolved metal measurement. For Mahoning River, there were 5 such paired samples available applicable to copper, lead, and silver. To account for the limited quantity of data, the DMT for each of these metals was determined as the lower end of the 95% confidence interval (1-tail) about the geometric mean of the total recoverable-to-dissolved ratios of the sample pairs. A DMT for zinc, cadmium, chromium, and nickel could not be determined due to shortcomings in the data. Each DMT is metal-specific and is applied by multiplying the dissolved criteria by the DMT, resulting in total effective recoverable criteria which can be used in the wasteload allocation procedures.

The Monte Carlo Model

The application of the Monte Carlo method was limited to the six commonly allocated metals (cadmium, chromium (total), copper, lead, nickel, and zinc). Previous allocations, using the conventional Ohio EPA conservative parameter model, resulted in stringent limits for these parameters that have been difficult for dischargers to maintain. As a result, the Ohio EPA was asked to consider other methods for determining effluent limits that would adequately protect the river while allowing the dischargers some relief. The Monte Carlo method addresses these concerns but does not guarantee more favorable discharge limits. This is the third permit cycle where a Monte Carlo method was used to determine the wasteload allocations for the six metals listed above.

Conventional water quality modeling methods project the receiving water pollutant concentration which will occur under critical low-flow conditions. The Monte Carlo probabilistic method, as applied to water quality modeling, projects the year-round probability distribution for the pollutant. This allows a more accurate determination of the frequency at which water quality criteria are violated or maintained.

Conventional modeling methods, when applied to systems with numerous dischargers, may be overly conservative because they model all dischargers at their maximum permitted concentration. The more dischargers modeled, the more unlikely it is that all will discharge at their maximum level at the same time and at critical low-flow conditions. The Monte Carlo method accounts for the independent variability of discharges as well as other model inputs.

The Monte Carlo model for the Mahoning River was originally developed by Limno-Tech, Inc., for their 1993 study to determine alternative copper limits for Thomas Strip Steel. The model combines the Monte Carlo statistical method with a multi-discharge mass-balance model and allows upstream flow to be input from a historical gaging station flow record, in order to to account for unusual flow fluctuations caused by the numerous upstream dams and reservoirs. Ohio EPA approved the alternative limits developed using this model and received permission to modify and apply the model in the future. The original model was written in 1992-1993 in Borland Pascal. For this permit cycle, the model has been modified by the Ohio EPA and re-written in the 'C' programming language.

River Hardness and Water Quality Criteria

Water quality criteria for the six metals depends on instream hardness. Thus, hardness is a key element in determining effluent limits. A detailed analysis of the available hardness and flow data was conducted. This analysis revises and updates the Ohio EPA analysis previously performed in 2002. Stream hardness data was taken from the two main STORET stations on the Mahoning River main stem, at Leavittsburg, Ohio (RM 45.51) and at Lowellville, Ohio (RM 12.42). The hardness data for the two stations was analyzed for the period January 1997 to October 2006.

A linear correlation between the Leavittsburg USGS gaging station flow and instream hardness was determined for both STORET stations. These correlations were then used to calculate hardness as a function of river mile at 97 cfs (Leavittsburg 1Q10 low flow) and 105 cfs (7Q10 low flow).

Acute Criteria, at 1Q10

$$\text{river hardness (mg/L)} = (-0.579)(\text{river mile}) + 185.447$$

Chronic Criteria, at 7Q10

$$\text{river hardness (mg/L)} = (-0.578)(\text{river mile}) + 185.204$$

Discharger hardness was calculated with these equations. This relationship established local river hardness for calculating outside-mixing-zone, hardness-dependent criteria in the Monte Carlo model. Inside-mixing-zone, maximum criteria were determined with effluent hardness data when available, or outside-mixing-zone hardness when effluent data was unavailable.

Table 2 contains the water quality criteria for Thomas Strip Steel for the six metals.

This Monte Carlo method uses a thirty-day averaging period with a ten-year return period for meeting chronic (average) water quality criteria. A one-day averaging period with a ten-year return period is used for meeting the acute (maximum) water quality criteria. Since the chronic aquatic life criteria are less than or approximate to both the agriculture and human health criteria and since the return periods for both agriculture and human health criteria would be longer than ten years, the allocations that meet the average aquatic life criteria will be protective of the agriculture and human health criteria as well.

Federal rules require that a downstream state's water quality criteria be considered when calculating

effluent limits. The Pennsylvania state line is at RM 11.43. Pennsylvania's standards are the same as Ohio's for copper, total chromium, nickel, and zinc. However, Pennsylvania's standards for cadmium and lead are more stringent than Ohio's and had to be considered. Since Pennsylvania uses, in effect, a one hundred-day return period, Ohio's acute criteria for those two metals, in combination with a ten-year return period, still meet Pennsylvania's water quality criteria. However, the same is not true for the chronic criteria.

Table 2. Water Quality Criteria for Monte Carlo Model Parameters (Thomas Strip Steel)

Parameter (µg/L)	Health	Outside Mixing Zone Criteria: Average: Human culture[A]	Outside Mixing Zone Criteria: Average: Agri-Life[B]	Outside Mixing Zone Criteria: Average: Aquatic Life[B]	Outside Mixing Zone Criteria: Maximum Aquatic Maximum[C]	Inside Mixing Zone
Cadmium		-	50.	0.42[E]	7.8	14.
Chromium, total		-	100.	130.	2700.	4900.
Copper		1300.	500.	15.[D]	23.[D]	57.
Lead		-	100.	6.1[D,E]	230.[D]	400.
Nickel		610.[E]	200.	79.	710.	1300.
Zinc		69000.	25000.	180.	180.	330.

[A] There is some uncertainty regarding the return period used to develop the Agricultural Water Supply (AWS) criteria. Therefore, the AWS criteria for the Monte Carlo model are presented for information purposes only.
[B] Based on river hardness of 163 mg/L.
[C] Based on effluent hardness of 146 mg/L.
[D] Effective Criteria Based on Application of Dissolved Metal Translator.
[E] Pennsylvania WQC at the state line.

Data Analysis for the Monte Carlo Model

The Monte Carlo method accounts for individual system component variability by generating probability distributions that predict a range of possible input conditions. These distributions are derived from the mean and the coefficient of variation input by the user and based on field data for each of these components. Table 2 lists the calculated mean and coefficient of variation for such system characteristics as background/ambient concentrations and discharger and tributary flows.

Table 3. Monte Carlo Model Inputs

Parameter	Mean	Coefficient of Variation Acute	Coefficient of Variation Chronic	Source
Mahoning River at Leavittsburg				
Flow (MGD)[A]	--	--	--	USGS
Cadmium (µg/L)	0.0	0.0	0.0	STORET
Chromium, total (µg/L)	0.0	0.0	0.0	STORET
Copper (µg/L)	0.0	0.0	0.0	STORET
Lead (µg/L)	1.242	0.739	0.135	STORET
Nickel (µg/L)	0.0	0.0	0.0	STORET
Zinc (µg/L)	8.966	0.507	0.093	STORET
Mosquito Creek at mouth				
Flow (MGD)	80.65	1.44	0.263	USGS/SWIMS
Cadmium (µg/L)	0.0	0.0	0.0	STORET
Chromium, total (µg/L)	0.0	0.0	0.0	STORET
Copper (µg/L)	1.916	0.326	0.060	STORET
Lead (µg/L)	3.7	0.383	0.070	STORET
Nickel (µg/L)	0.0	0.0	0.0	STORET
Zinc (µg/L)	18.45	0.607	0.111	STORET
Meander Creek at mouth				
Flow (MGD)	3.706	0.330	0.060	SWIMS
Cadmium (µg/L)	0.0	0.0	0.0	STORET
Chromium, total (µg/L)	0.0	0.0	0.0	STORET
Copper (µg/L)	2.614	0.895	0.163	STORET
Lead (µg/L)	1.509	1.192	0.218	STORET
Nickel (µg/L)	0.0	0.0	0.0	STORET
Zinc (µg/L)	28.394	0.468	0.085	STORET
Little Squaw Creek at mouth				
Flow (MGD)	2.808	0.537	0.098	SWIMS
Cadmium (µg/L)	0.095	2.425	0.443	SWIMS
Chromium, total (µg/L)	2.722	1.229	0.224	SWIMS
Copper (µg/L)	7.603	1.155	0.211	SWIMS
Lead (µg/L)	0.0	0.0	0.0	SWIMS
Nickel (µg/L)	2.644	2.621	0.479	SWIMS
Zinc (µg/L)	70.56	0.949	0.173	SWIMS
Mill Creek at mouth				
Flow (MGD)	44.52	2.23	0.407	USGS
Cadmium (µg/L)	0.12	0.48	0.088	STORET
Chromium, total (µg/L)	0.0	0.0	0.0	STORET
Copper (µg/L)	2.37	0.70	0.127	STORET
Lead (µg/L)	4.12	1.95	0.356	STORET
Nickel (µg/L)	28.1	0.30	0.055	STORET
Zinc (µg/L)	13.5	1.87	0.34	STORET

Table 2. Monte Carlo Model Inputs (continued)

Parameter	Mean	Coefficient of Variation Acute	Coefficient of Variation Chronic	Source
Discharger flows (MGD)				
Warren Steel Holdings (CSC)	0.657	0.905	0.165	SWIMS
Thomas Steel Strip	1.11	0.336	0.061	SWIMS
Warren Consolidated Industries				
003	0.094	0.528	0.096	SWIMS
006	0.002	0.340	0.062	SWIMS
007	2.48[C]	0.314	0.057	SWIMS
008	6.50	0.179	0.033	SWIMS
Intake[B]	--.--	--.--	--.--	---
013	38.25	0.188	0.034	SWIMS
010	0.442	0.473	0.086	SWIMS
011	0.601	0.346	0.063	SWIMS
012	0.158	0.184	0.034	SWIMS
Mittal 014	3.512	0.359	0.066	SWIMS
Warren WWTP	14.28	0.440	0.080	SWIMS
Reactive Metals Inc.	0.374	0.408	0.075	SWIMS
Orion Power				
002	3.437	0.300	0.055	SWIMS
008	0.001	0.0	0.0	SWIMS
Niles WWTP	5.512	0.558	0.102	SWIMS
McDonald Steel	0.725	0.310	0.057	SWIMS
Youngstown WWTP	37.25	0.313	0.057	SWIMS
Campbell WWTP	1.624	0.515	0.094	SWIMS
Struthers WWTP	4.643	0.306	0.056	SWIMS
Lowellville WWTP	0.358	0.666	0.122	SWIMS

[A] Each iteration of the model sequentially selects an upstream flow from the historical flow record at this gage.

[B] Intake flow was set equal to the sum of the WCI effluent flows plus the Mittal flow, multiplied by 0.871. (12.9% of the WCI / Mittal flow comes from sources other than the intake.)

[C] Recommended by Erm Gomes; outfall is submerged and no recent flows are available

The Conservative Substance Wasteload Allocation Model (CONSWLA)
The Conservative Substance Wasteload Allocation Model (CONSWLA) was used to allocate all parameters not included in the Monte Carlo model. CONSWLA is the model Ohio EPA typically uses in multiple discharger situations. Contrary to the Monte Carlo model, described above, CONSWLA model inputs for flow are fixed at their critical low levels and inputs for effluent flow are fixed at their design or 50th percentile levels. Background concentrations are fixed at a representative value (generally a 50th percentile). A mass balancing method is then used to allocate effluent concentrations that maintain WQS under these conditions. This technique is appropriate when data bases are unavailable to generate statistical distributions for inputs (like those used in the Monte Carlo method) and if the parameters modeled are conservative.

Reasonable Potential
After appropriate effluent limits are calculated (using the Monte Carlo and CONSWLA models), the reasonable potential of the discharger to violate the WLA (and the WQS) must be determined. Each parameter is examined and placed in a defined "group". Parameters that do not have a WQS or do not require a WLA based on the initial screening are assigned to either group 1 or 2. For the allocated parameters, the most restrictive average WLA and the maximum WLA were selected from Table 6. The average PEQ value (Table 3) is compared to the average PEL, and the maximum PEQ value is compared to the maximum PEL. Based on the calculated percentage of the respective average and maximum comparisons, the parameters are assigned to “groups”, as listed in Table 7.

Whole Effluent Toxicity WLA
Whole effluent toxicity or “WET” is the total toxic effect of an effluent on aquatic life measured directly with a toxicity test. Acute WET measures short term effects of the effluent while chronic WET measures longer term and potentially more subtle effects of the effluent.

Water Quality Standards for WET are expressed in Ohio’s narrative “free from” WQS rule (OAC 3745-1-04(D)). These “free froms” are translated into toxicity units (TUs) by the associated WQS Implementation Rule (OAC 3745-2-09). Wasteload allocations can then be calculated using TUs as if they were water quality criteria.

The wasteload allocation calculations for WET are similar to those for aquatic life criteria (using the chronic toxicity unit (TU_c) and 7Q10 for average and the acute toxicity unit (TU_a) and 1Q10 for maximum). These values are the levels of effluent toxicity that should not cause instream toxicity during critical low-flow conditions. An assessment of the biological and hydraulic data in the vicinity of Thomas Steel Strip indicated that the effluent acute toxicity is not interactive with other dischargers. For Thomas Steel Strip, the AET values are 1.0 TU_a and 50.2. TU_c.

The chronic toxicity unit (TU_c) is defined as 100 divided by the IC_{25}:

$$TU_c = \frac{100}{IC_{25}}$$

This equation applies outside the mixing zone for warmwater, modified warmwater, exceptional warmwater, coldwater, and seasonal salmonid use designations except when the following equation is more restrictive (Ceriodaphnia dubia only):

$$TUc = \frac{100}{\text{geometric mean of NOEC and LOEC}}$$

The acute toxicity unit (TU_a) is defined as 100 divided by the LC50 for the most sensitive test species:

$$TU_a = \frac{100}{LC50}$$

This equation applies outside the mixing zone for warmwater, modified warmwater, exceptional warmwater, coldwater, and seasonal salmonid use designations.

Effluent Limits/Hazard Management Decisions

Federal and State laws/regulation require that dischargers meet both treatment technology-based limits and any more stringent standards needed to comply with state WQS. Permit limits are based on the more restrictive of the two. The listing in Table 13 reflects the hazard assessment (or "groupings") done according to WLA procedures. Tables 14 and 15 show the draft NPDES limits for Thomas Steel Strip. The draft limits include consideration of treatment technology-based limits, whole effluent toxicity reasonable potential evaluations and other portions of NPDES rules, as well as the water quality-based limits.

Outfalls 601/603:
Discharge limits for outfalls 601 are mostly treatment technology-based limits from USEPA's effluent guidelines for the Metal Finishing and Iron and Steel effluent guidelines. While Iron & Steel wastewaters are not routinely discharged, the effluent limits provide a factor for these pollutants. The net effect of this allowance is to increase the loading, but decrease the allowable concentration for outfall 601.

Treatment-technology-based limits for the Iron & Steel Industry, found in 40 CFR Part 420 (Cold Forming Subcategory), are based on the kilograms of pollutant allowed to be discharged per 1000 kg. of production. The plant production rates used are the maximum 30-day average rates for the past five years. Limits are calculated as follows: TSS limits (kg./day) = BCT (kg./kkg.) x production (kkg./day), or

TSS = 0.000626 kg/kkg x 150 tons/day x 0.908 kkg/ton = 0.085261 kg/day (average). Load allowances for maximum TSS, oil&grease, lead, zinc, napthalene and tetrachloroethylene are calculated the same way. Loading allowances for both cold forming processes are then added together to derive the loading allowance for Iron & Steel processes.

Metal finishing wastewaters make up the larger portion of the 601 effluent flow. The Metal Finishing treatment-technology-based limits are concentration-based. The concentrations from 40 CFR 433 are applied to the effluent flow from the metal finishing process to calculate the Metal Finishing load allowance. For average TSS, the calculation is:

TSS = 31 mg/l x 0.316 MGD x 3.785 liters/gallon = 37.08 kg/day. The loading allowances for the Metal Finishing and Iron & Steel processes are added together to determine the loading limits for outfall 601. The concentration limits are derived by dividing the load limit by 0.325 MGD (the total flow for outfall 601) and dividing again by 3.785 liters/gallon.

Effluent limits for copper and hexavalent chromium are not based on the effluent guidelines. The copper limit in the current permit is more restrictive than the effluent guidelines. Ohio's Antibacksliding Rule, OAC 3745-33-05(E) prevents raising effluent limits except in very specific circumstances. Ohio EPA is proposing to continue the current copper limit in the new permit.

Hexavalent chromium is generated in some of Thomas Steel's processes. The current effluent limit ensures that hexavalent chromium levels in the discharge are adequately reduced before reaching the Mahoning River.
The Metal Finishing effluent guideline limits for total cyanide are applied at the discharge from the cyanide treatment system (outfall 603). The effluent guidelines allow compliance monitoring at this point as an option in the rule.

Outfall 001
Proposed limits for total suspended solids (TSS), oil&grease and pH are all based on current permit limits. The limits are being continued as required by Ohio's antibacksliding rule [OAC 3745-33-05(E)]. The limits for oil&grease and pH will meet WQS in the Mahoning River.

The Ohio EPA risk assessment (Table 13) places ammonia-N, residual chlorine, copper, free cyanide, mercury and nickel in group 5. This placement as well as the data in Tables 4, 5 and 9 indicate that the reasonable potential to exceed WQS exists and limits are necessary to protect water quality. For all parameters except ammonia-N, PEQ is greater than 100 % of the wasteload allocation; for ammonia-N, PEQ is greater than the inside-mixing-zone WQS. Pollutants that meet these requirements must have permit limits under OAC Rule 3745-33-07(A)(1). The permit includes a compliance schedule to allow time to meet new limits for ammonia, cyanide and nickel.

Reasonable potential for ammonia was determined by comparing effluent concentrations and PEQs with IMZM WQS for ammonia. The IMZM standards were established using 75th percentile temperature and pH data from the Warren WWTP upstream location [Temperature - 22C (summer), 4C (winter); pH - 7.8 (summer), 8.0 (winter)]. The IMZM standards are more restrictive than the allocation to meet outside-mixing-zone WQS.

Copper allocations in this segment of the Mahoning River (Leavittsburg to Meander Creek) have been adjusted to add copper allocations to facilities that need additional load, using allocated load from other facilities that do not have the reasonable potential to contribute to exceedances of copper WQS. Essentially, load has been redistributed from WCI Steel to Mittal Steel, RMI Company and Thomas Steel Strip. This is a temporary adjustment, and may be changed back if WCI Steel needs additional load to expand facilities or production. The additional load for Thomas Steel brings the adjusted allocation to values that equal the current total recoverable copper limit for the discharge; however, this limit may exceed IMZM concentrations, depending on whether the copper is in the dissolved (more toxic) form, or suspended (less toxic) form. The permit contains an additional limit on dissolved copper to ensure that copper discharges do not cause rapidly lethal conditions near the outfall.

<u>Mercury Reasonable Potential / Thomas Steel Strip Mercury Variance Request</u>

The Ohio EPA risk assessment (Table 8) places mercury in group 5. This placement as well as the data in Tables 1, 2 and 4 indicate that the reasonable potential to exceed WQS exists and limits are necessary to protect water quality. The existing permit includes limits for mercury and the option to apply for a variance that would relieve the permittee from meeting the 30-day water-quality-based effluent limit (WQBEL) for mercury. Thomas Steel Strip has chosen to apply for a mercury variance, and submitted a variance request in November 2007. Based on the monitoring results from September 2002 through September 2007 using EPA Method 1631, Revision B, the company has determined that the WWTP will not meet the 30-day average permit limit of 12 nanograms per liter (ng/l). However, the company believes that the mercury monitoring results will allow compliance with an annual average value of 12 ng/l. The company's application has also demonstrated to the satisfaction of Ohio EPA that there is no readily apparent means of complying with the WQBEL without constructing prohibitively expensive end-of-pipe controls for mercury. Based upon these demonstrations, Thomas Steel Strip is eligible for the mercury variance under Rule 3745-33-07(D)(10)(a) of the Ohio Administrative Code (OAC).

Ohio EPA has reviewed the mercury variance application and has determined that the application meets the requirements of the OAC. As a result, the variance is proposed to be issued as a condition in Part II of the NPDES permit, and the following requirements have been incorporated into the draft permit:

- mercury effluent limits developed from sampling data submitted by Thomas Steel Strip of 25 ng/l for the 30-day average limit. The daily maximum limit is based on maximum WQS;
- a requirement that Thomas Steel Strip make reasonable progress to meet the water-quality-based effluent limit for mercury by implementing the plan of study which has been developed as part of the pollutant minimization program;
- influent and effluent monitoring for mercury;
- a requirement that the average annual effluent concentration for mercury is less than or equal to 12 ng/l as specified in the plan of study;
- a summary of the elements of the plan of study;
- a requirement for Thomas Steel Strip to use the most sensitive analytical method approved by U.S.EPA; and,
- a requirement that Thomas Steel Strip submit a certification to Ohio EPA stating that all required permit conditions for the plan of study have been satisfied once these have been completed. In addition, the certification must state that compliance with the WQBEL for mercury has not been achieved.

Ohio EPA risk assessment (Table 13) places boron and zinc in group 4. This placement as well as the data in Tables 4, 5 and 9 support that these parameters do not have the reasonable potential to contribute to WQS exceedances, and limits are not necessary to protect water quality. Monitoring for Group 4 pollutants (where PEQ exceeds 50% of the WLA) is required by OAC Rule 3745-33-07(A)(2).

Ohio EPA risk assessment (Table 13) places dissolved solids, cadmium, chromium and lead in groups 2/3. This placement as well as the data in Tables 4, 5 and 9 support that these parameters do not have the reasonable potential to contribute to WQS exceedances, and limits are not necessary to protect water quality. Dissolved solids monitoring is being continued, because it may be related to effluent toxicity. Monitoring for cadmium, chromium and lead is being continued because these parameters are part of the Monte Carlo model, and significant amounts of data are needed for all dischargers in order to run the model.

<u>Whole Effluent Toxicity Reasonable Potential</u>

WET values are compared to wasteload allocation values. This comparison along with an assessment of the instream community are two ways in which whole effluent toxicity is evaluated. For the Thomas Steel Strip outfall 001, the chronic WLA is 50.2 TU_c and acute WLA is 1.0 TU_a.

The 001 outfall frequently shows acute toxicity greater than 1.0 TUa, the level of toxicity normally associated with rapid lethality. Thomas Steel conducted studies in 2004 to show that a higher level of acute toxicity in the effluent could meet the 'no rapid lethality' narrative water quality standard in OAC 3745-1-04(D). In 2006, Ohio EPA approved a modification to the NPDES permit that raised the acute toxicity limit to 2.5 TUa, based on Thomas Steel's dilution studies, and the improvements to the treatment plant that the company had made over the previous few years. This approval was granted with the understanding that Ohio EPA would review this limit in conjunction with the 2006 biological data for this permit renewal.

The 2006 biological and chemical data indicates that the 'no rapid lethality' standard is still not being met. While the treatment plant improvements may have reduced the size of the zone of toxicity, the biological data shows that a toxic zone still exists along the west bank of the river. This zone appears to be less than 6 feet in width, and is not more than 0.3 miles long. The chemical data (water and stream sediment) shows that this impact is likely related to periodic high concentrations of pollutants from the outfall.

Because of these survey results, Ohio EPA does not believe that the 2004 dilution study can be wholly accepted. The dilution results for the Mahoning River in that study are not associated with attainment of the 'no rapid lethality' standard, and can not be applied in light of the survey results. However, the dilution study does show some dilution of the 001 discharge in the Dickey Run storm sewer, even during relatively low-flow periods. Ohio EPA has no basis to reject this part of the dilution study, and therefore has based the effluent toxicity limit on the Dickey Run dilution only. Based on the dissolved solids data from the dilution study, the average dilution factor in Dickey Run is 1.5; therefore Ohio EPA is proposing an acute toxicity limit of 1.5 TUa.

Figure 1. Approximate location of the Thomas Steel Strip.

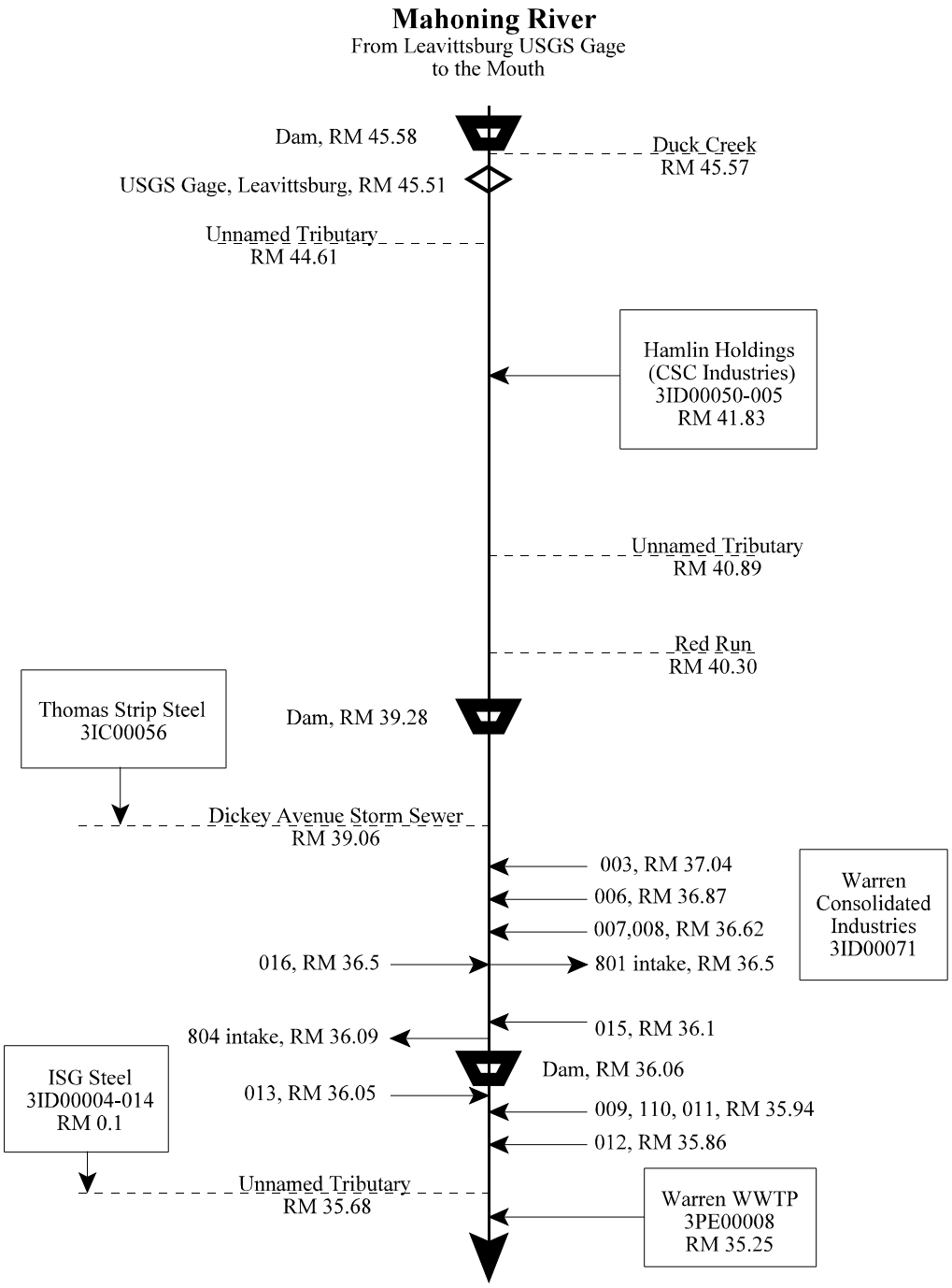

Figure 2. Lower Mahoning River Study Area.

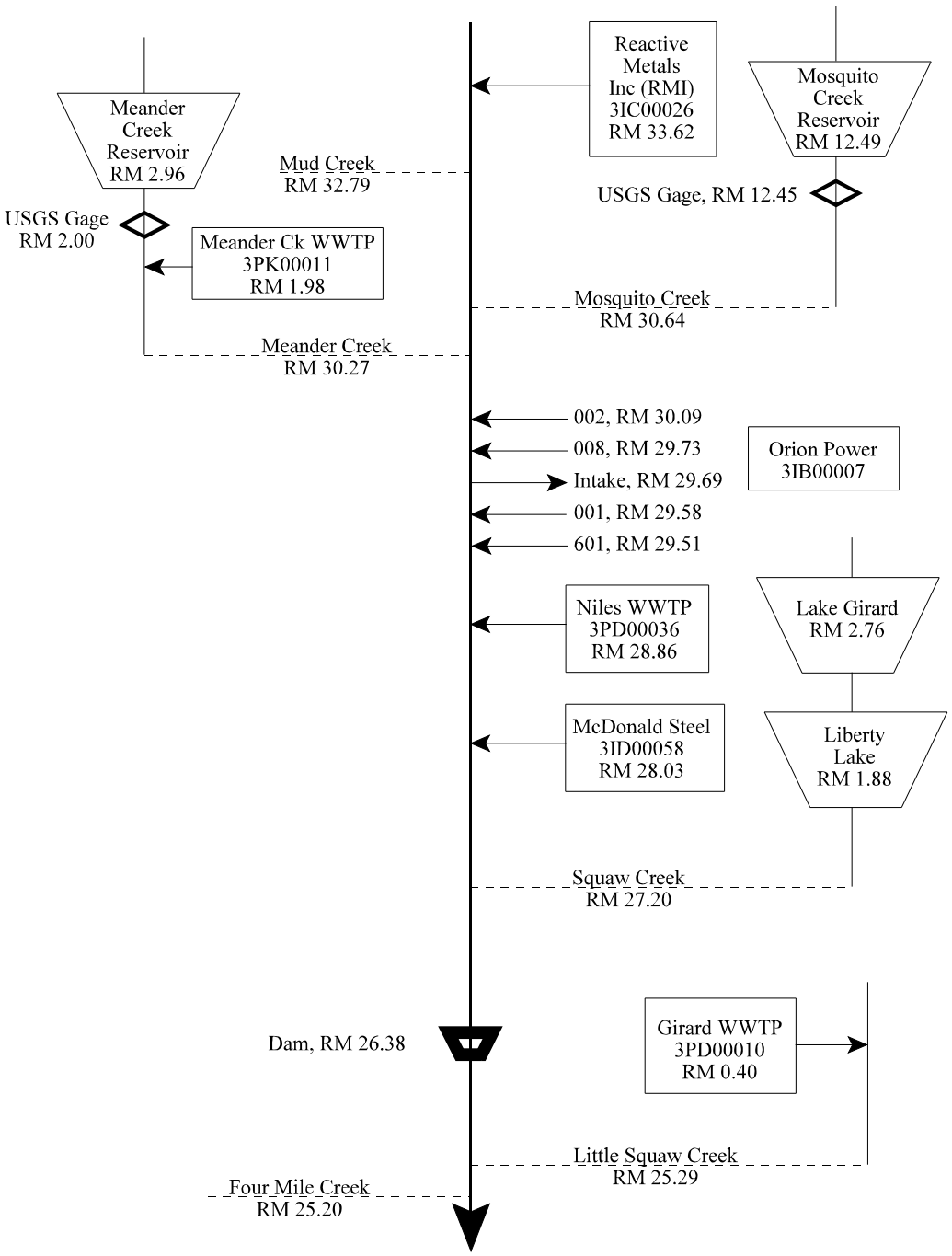

Figure 2. Lower Mahoning River Study Area (continued).

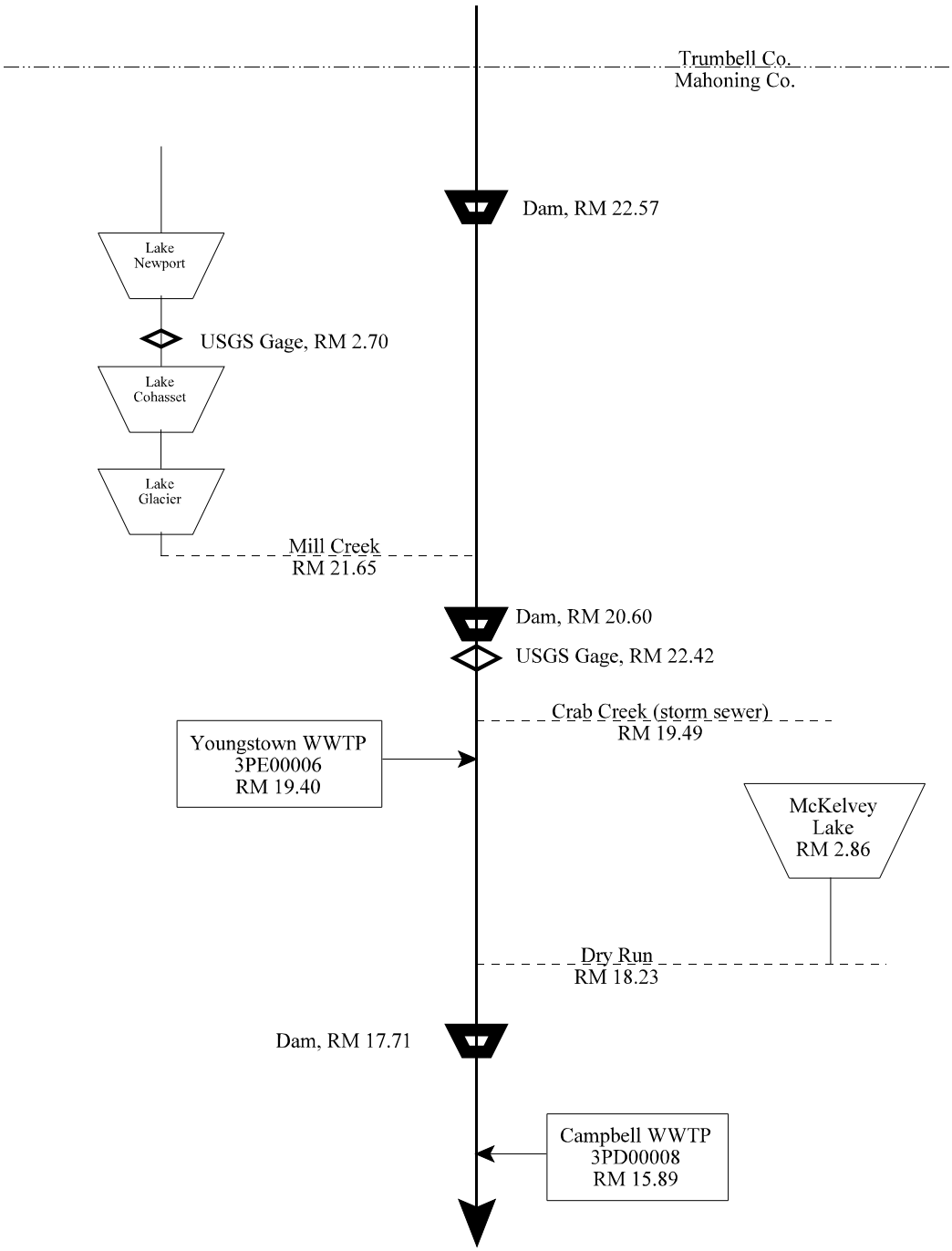

Figure 2. Lower Mahoning River Study Area (continued).

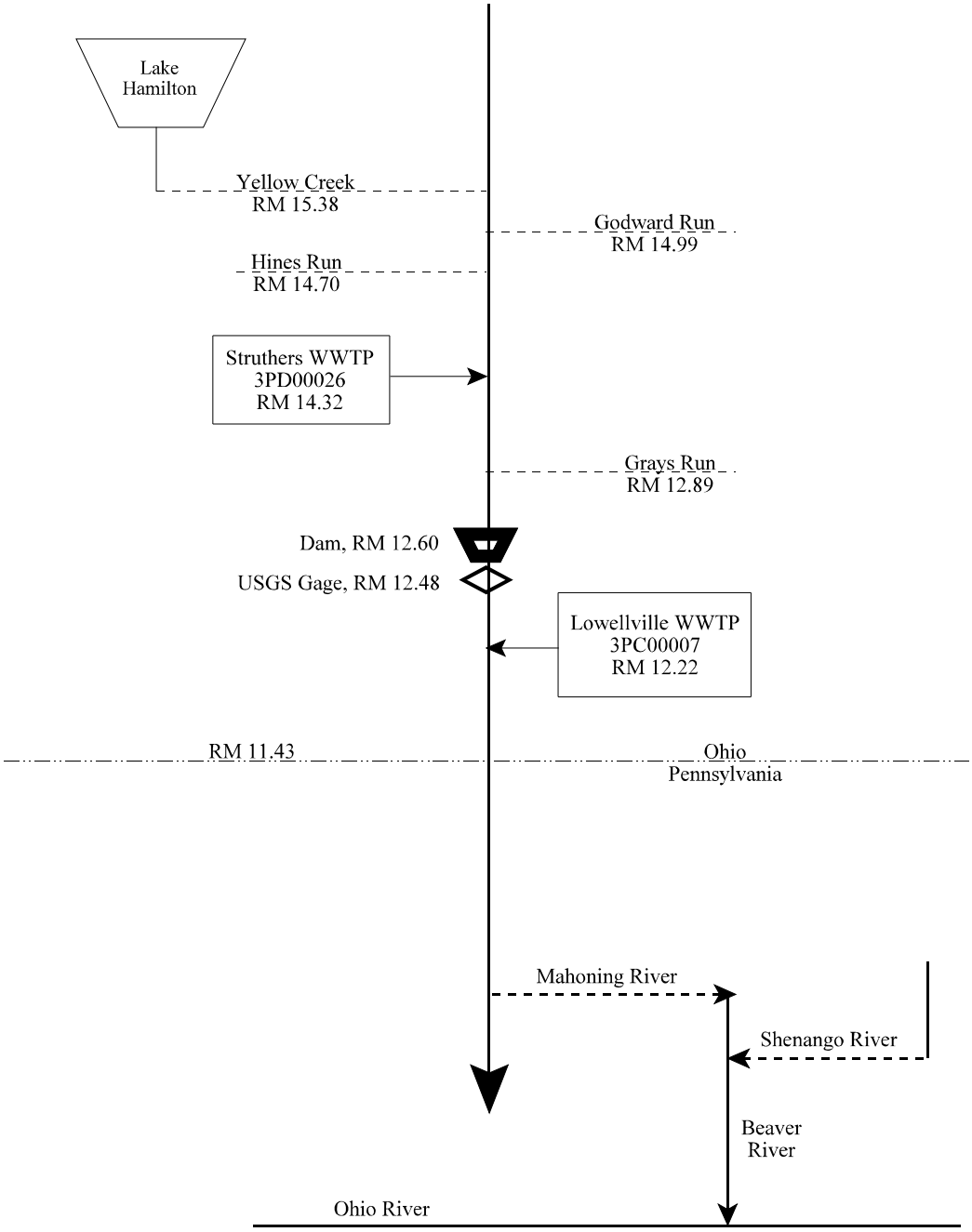

Figure 2. Lower Mahoning River Study Area (continued).

Table 4. Effluent Characterization and Decision Criteria

Summary of analytical results for Thomas Steel Strip outfall 3IC00056001. All values are in µg/l unless otherwise indicated. 2C = Data from application form 2C; OEPA = data from analyses by Ohio EPA; J = estimated concentration less than analytical quantification level; ND = below detection (detection limit); NA = not analyzed. Decision Criteria: PEQ_{avg} = monthly averages; PEQ_{max} = daily maximum analytical results.

		OEPA	Thomas Steel 2006 App. Form 2C			DECISION CRITERIA	
PARAMETER		06/14/05	N	mean	maximum	PEQ_{avg}	PEQ_{max}
BOD5	mg/l	2.9	1	–	2		
COD	mg/l	28	1	–	21		
Organic C	mg/l	NA	1	–	8		
Suspended Solids	mg/l	<5	234	4.6	25		
Dissolved Solids	mg/l	1490	NA	NA	NA	1714	2146
Ammonia-N	mg/l	37.2	1	–	27	103	141
Nitrate/Nitrite-N	mg/l	2.19	1	–	0.9	6.08	8.32
Organic-N	mg/l	0.3	1	–	2.0		
Phosphorus	mg/l	0.367	1	–	0.2	1.01	1.39
Oil&grease	mg/l	2.0	234	1.5	5.3		
Chloride	mg/l	368	NA	NA	NA	1666	2282
Sulfate	mg/l	NA	1	–	472		
Hardness	mg/l	139	NA	NA	NA		
Aluminum		<200	120	58	120	95	129
Antimony		NA	1	–	0.62(J)		
Arsenic		<2.0	1	–	1(J)		
Barium		15	1	–	16.5	46	63
Boron		NA	1	–	1730	7830	10726
Chromium		<30	120	1	60	8.7	12.7
Cobalt		NA	1	–	0.68(J)		
Copper		140	120	69	294	149	221
Iron		330	3	389	966	2619	3588
Magnesium	mg/l	7	1	–	17.5	49	66
Manganese		27	1	–	32	89	122
Mercury	ng/l	NA	9	11	47	61	106
Molybdenum		NA	1	–	33.7	153	209
Nickel		53	119	120	1150	263	390
Potassium	mg/l	4	NA	NA	NA	18.1	24.8
Selenium		<4.0	27	1	9	5.8	8.6
Silver		NA	1	–	0.3(J)		
Strontium		490	NA	NA	NA	2218	3038
Tin		NA	1	–	0.99(J)		
Zinc		31	120	41	144	84	124
Cyanide, Tot.		270	1	–	170		
Phenolics, Tot.		NA	1	–	11(J)		
Bromodichlormethane		2.6	3	–	<5	9.5	13
Chloroform		22	26	<5	20	230	233
Naphthalene		3	1	–	<10	14	19
Phenol		<2.0	1	–	11(J)		
Butylbenzylphthalate		3.6	1	–	<10	16	22
Bis(2-ethylhexyl)phthalate		<10.2	1	–	3.6(J)		

Table 5. Effluent Characterization and Decision Criteria

Summary of current permit limits and unaltered monthly operating report (MOR) data for Thomas Steel Strip outfall 3IC00056, in-plant monitoring stations 3IC00056601 and 3IC00056603, and upstream (3IC00056801) and downstream (3IC00056901) monitoring points. All values are based on annual records unless otherwise indicated. N = Number of Analyses. * = For pH, 5th percentile shown in place of 50th percentile; ** = For dissolved oxygen, 5th percentile shown in place of 95th percentile; A = 7 day average. Decision Criteria: PEQ_{avg} = monthly average; PEQ_{max} = daily maximum analytical results.

Parameter	Season	Units	Current Permit Limits		# Obs.	Percentiles		Data Range	Decision Criteria		
			30 day	Daily		50th	95th		# Obs.	PEQ_{ave}	PEQ_{max}
Outfall 001											
Biochemical Oxygen Demand, 5 Day	Summer	mg/l	--	--	4	80.5	118	0-122			
Biochemical Oxygen Demand, 5 Day	Winter	mg/l	--	--	0	0	0	0-0			
Chemical Oxygen Demand (Low Level)	Annual	mg/l	--	--	4	126	198	21-207			
pH	Annual	S.U.	6.5 min.	9.5 max.	534	9	9.5	6.8-9.5			
Residue, Total Dissolved	Annual	mg/l	Monitor		240	1200	2000	200-3000	231	1714	2146
Total Suspended Solids	Annual	mg/l	30	45	534	3.5	15	1-27			
Oil and Grease, Hexane Extr Method	Annual	mg/l	10	20	474	1.5	3.4	0.1-6.7			
Oil and Grease, Freon Extr-Grav Meth	Annual	mg/l	--	--	60	2	4.13	0.1-6.7			
Nitrogen, Ammonia (NH3)	Summer	mg/l	--	--	4	0	0	0-0	2	103	141
Nitrogen, Ammonia (NH3)	Winter	mg/l	--	--	0	0	0	0-0	2	103	141
Cyanide, Free	Annual	mg/l	Monitor		469	0.03	0.0672	0-202	509	0.048	0.078
Cyanide, Free	Annual	mg/l	Monitor		60	0.028	0.068	0-0.074	509	0.048	0.078
Aluminum, Total Recoverable	Annual	ug/l	Monitor		240	60	120	0-340	231	95	129
Cadmium, Total (Cd)	Annual	ug/l	--	--	2	0	0	0-0			
Chromium, Total Recoverable	Annual	ug/l	Monitor		240	0	10	0-60	262	148	221
Chromium, Total	Annual	ug/l	--	--	31	0	10	0-30	262	148	221
Chromium, Dissolved Hexavalent	Annual	ug/l	Monitor		271	0	0	0-0			
Copper, Dissolved (Cu)	Annual	ug/l	Monitor		271	40	117	0-4000			
Copper, Total Recoverable	Annual	ug/l	--	130	240	60	145	0-4200	262	148	221
Copper, Total Recoverable	Annual	ug/l	--	130	31	56	159	16-248	262	148	221
Iron, Total Recoverable	Annual	ug/l	--	--	4	123	1190	0.06-1380	4	2619	3588

Parameter	Season	Units	Current Permit Limits		# Obs.	Percentiles		Data Range	Decision Criteria		
			30 day	Daily		50th	95th		# Obs.	PEQ_{ave}	PEQ_{max}
Lead, Total Recoverable	Annual	ug/l	Monitor		240	0	0	0-0			
Lead, Total Recoverable	Annual	ug/l	Monitor		31	0	0	0-0			
Mercury, Total (Low Level)	Annual	ng/l	Monitor		19	6.49	61	1.19-187	19	61	106
Nickel, Total Recoverable	Annual	ug/l	Monitor		240	80	271	0-1150	262	263	390
Nickel, Total Recoverable	Annual	ug/l	Monitor		31	70	405	0-720	262	263	390
Selenium, Total (Se)	Annual	ug/l	--	--	31	0	14	0-24	262	5.8	8.6
Selenium, Total Recoverable	Annual	ug/l	Monitor		240	0	6	0-15	262	5.8	8.6
Zinc, Total Recoverable	Annual	ug/l	--	170	240	40	120	3-470	262	84	124
Zinc, Total	Annual	ug/l	--	--	31	30	75	0-120	262	84	124
Bromodichloromethane	Annual	ug/l	Monitor		22	0	0	0-0	4	9.5	13
Dibromochloromethane, Total	Annual	ug/l	Monitor		21	0	0	0-0			
Chloroform	Annual	ug/l	38	2600	66	0	190	0-250	64	230	233
Methyl Bromide	Annual	ug/l	Monitor		21	0	0	0-0			
Methyl Chloride	Annual	ug/l	Monitor		21	0	0	0-0			
Methylene Chloride	Annual	ug/l	Monitor		21	0	0	0-0			
Halomethane, Sum of	Annual	ug/l	--	--	11	13	214	0-320			
Flow Rate	Summer	MGD	Monitor		257	1.03	1.55	0.515-2.15			
Flow Rate	Winter	MGD	Monitor		264	1.01	2.02	0.383-2.61			
Flow Rate	Annual	MGD	Monitor		521	1.02	1.88	0.383-2.61			
Chlorine, Total Residual	Annual	mg/l	--	0.036	68	0	4.26	0-12.7	66	9.271	12.7
Acute Toxicity, Ceriodaphnia dubia	Annual	TUa	--	2.5	47	1.4	5.92	0-13.7			
Chronic Toxicity, Ceriodaphnia dubia	Annual	TUc	Monitor		15	11.4	35	1.4-50			
Acute Toxicity, Pimephales promelas	Annual	TUa	Monitor		17	0	1.12	0-1.2			
Chronic Toxicity, Pimephales promelas	Annual	TUc	Monitor		17	0	1.4	0-1.4			
Outfall 601											
pH	Annual	S.U.	Monitor		534	9.2	9.7	7.2-10.2			
Total Suspended Solids	Annual	mg/l	30.8	59.6	534	3	10	1-23			
Oil and Grease, Total	Annual	mg/l	Monitor		534	1.6	3.7	0.1-11			
Cadmium, Total Recoverable	Annual	ug/l	252	670	56	0	0	0-20			

Parameter	Season	Units	Current Permit Limits		# Obs.	Percentiles		Data Range	Decision Criteria		
			30 day	Daily		50th	95th		# Obs.	PEQ_{ave}	PEQ_{max}
Outfall 601											
Chromium, Total (Cr)	Annual	ug/l	1660	2700	475	0	16	0-80			
Chromium, Total	Annual	ug/l	1660	2700	60	0	30	0-50			
Cobalt, Total (Co)	Annual	ug/l	Monitor		535	10	50	0-288			
Nickel, Total Recoverable	Annual	ug/l	2320	3880	470	130	716	0-1790			
Nickel, Total Recoverable	Annual	ug/l	2320	3880	60	60	287	0-1010			
Silver, Total Recoverable	Annual	ug/l	233	417	56	0	0	0-0			
Zinc, Total (Zn)	Annual	ug/l	1440	2550	475	40	321	0-1810			
Zinc, Total	Annual	ug/l	1440	2550	60	10	51	0-90			
Lead, Total Recoverable	Annual	ug/l	420	680	475	0	0	0-0			
Lead, Total Recoverable	Annual	ug/l	420	680	60	0	0	0-0			
Copper, Total Recoverable	Annual	ug/l	845	1386	475	90	421	0-5500			
Copper, Total Recoverable	Annual	ug/l	845	1386	60	26.5	102	8-394			
Chromium, Dissolved Hexavalent	Annual	ug/l	**	**	475	0	0	0-0			
Chromium Hexavalent	Annual	ug/l	**	**	60	0	0	0-0			
Tetrachloroethylene	Annual	ug/l	--	***	5	0	0	0-0			
Naphthalene	Annual	ug/l	--	****	5	0	0	0-0			
Flow Rate	Summer	MGD	Monitor		255	0.361	0.512	0.118-0.61			
Flow Rate	Winter	MGD	Monitor		274	0.359	0.546	0.098-0.679			
Flow Rate	Annual	MGD	Monitor		529	0.36	0.532	0.098-0.679			

** - Hex.Chromium limits - 0.57 kg/day (30-day), 0.92 kg/day (daily max.)

*** - Tetrachloroethylene limit - 0.0042 kg/day (daily max.)

**** - Naphthalene limit - 0.0028 kg/day (daily max.)

Parameter	Season	Units	Current Permit Limits		# Obs.	Percentiles		Data Range	Decision Criteria		
			30 day	Daily		50th	95th		# Obs.	PEQ_{ave}	PEQ_{max}
Outfall 603											
Flow Rate	Annual	MGD	Monitor		497	0.007	0.013	0.001-0.017			
Cyanide, Amenable to Chlorination	Annual	ug/l	320	860	57	272	360	100-393			
Cyanide, Amenable to Chlorination	Annual	ug/l	320	860	462	124	266	0-782			
Outfall 801											
Cobalt, Total (Co)	Annual	ug/l	Monitor		60	0	0.5	0-40			
Acute Toxicity, Ceriodaphnia dubia	Annual	TUa	--	--	7	0	0	0-0			
48-Hr. Acute Toxicity Ceriodaphnia dubia	Annual	% Aff.	Monitor		23	0	41.6	0-100			
96-Hr. Acute Toxicity Pimephales promela	Annual	% Aff.	Monitor		12	0	11.8	0-17			
7-Day Chronic Toxicity Ceriodaphnia dubia	Annual	% Aff.	Monitor		10	0	44	0-80			
7-Day Chronic Toxicity Pimephales promelas	Annual	% Aff.	Monitor		11	10	27	0-27			
Outfall 901											
Cobalt, Total (Co)	Annual	ug/l	Monitor		61	0	0	0-20			
Copper, Dissolved (Cu)	Annual	ug/l	Monitor		55	10	20	0-20			
Zinc, Dissolved (Zn)	Annual	ug/l	Monitor		55	10	20	0-20			
Zinc, Total Recoverable	Annual	ug/l	Monitor		55	20	30	0-40			
Copper, Total Recoverable	Annual	ug/l	Monitor		55	20	30	0-30			
Acute Toxicity, Ceriodaphnia dubia	Annual	TUa	--	--	7	0	0.7	0-1			
48-Hr. Acute Toxicity Ceriodaphnia dubia	Annual	% Aff.	--	--	3	0	0	0-0			
96-Hr. Acute Toxicity Pimephales promelas	Annual	% Aff.	--	--	2	16.5	26.9	5-28			

Table 6. Summary of ACUTE toxicity test results on the Thomas Steel Strip effluent from outfall 3IC00056001.

TEST DATE(a)	*Ceriodaphnia dubia 48 hour*						*Fathead Minnows 48 hour*					
	UP[b]	C[c]	LC_{50}[d]	%M[i]	TUa[g]	NF[h]	UP[b]	C[c]	LC_{50}[d]	%M[i]	TUa[g]	NF[h]
E 02/10/04	0	NR	46.7	>50	2.14	NT	NT	NT	NT	NT	NT	NT
E 02/16/04	NR	NR	67	>50	1.5	NT	NT	NT	NT	NT	NT	NT
E 02/23/04	NR	NR	>100	0	<1.0	NT	NT	NT	NT	NT	NT	NT
E 03/01/04	NR	NR	62.5	>50	1.6	NT	NT	NT	NT	NT	NT	NT
E 04/13/04	NR	NR	83	>50	1.2	NT	NT	NT	NT	NT	NT	NT
E 04/20/04	NR	NR	21	>50	4.8	NT	NT	NT	NT	NT	NT	NT
E 04/21/04	NR	NR	62.5	>50	1.6	NT	NT	NT	NT	NT	NT	NT
E 04/27/04	NR	NR	>100	0	<1.0	NT	NT	NT	NT	NT	NT	NT
E 05/18/04	5	NR	>100	35	0.7	NT	0	NR	>100	0	<1.0	NT
E 08/10/04	0	NR	77	>50	1.3	NT	NR	NR	>100	10	0.2	NT
E 11/09/04	NR	NR	23	>50	4.4	NT	NR	NR	>100	10	0.2	NT
E 02/08/05	NT	NT	NT	NT	NT	NT	NR	NR	>100	0	<1.0	NT
E 03/13/05	0	NR	>100	0	<1.0	NT	NT	NT	NT	NT	NT	NT
E 05/17/05	0	NR	>100	0	<1.0	NT	0	NR	>100	0	<1.0	NT
O 06/14/05	0	0	34.2	100	2.9	20	0	0	63.8	60	1.56	0
E 08/09/05	0	NR	>100	0	<1.0	NT	0	NR	>100	0	<1.0	NT
E 11/29/05	0	NR	>100	30	0.6	NT	5	NR	>100	0	<1.0	NT
E 02/23/06	45	I	I	I	I	NT	0	NR	>100	25	0.5	NT
E 05/13/06	0	NR	77	>50	1.3	NT	7.5	NR	>100	0	<1.0	NT
E 08/29/06	NT	NR	71	>50	1.4	NT	0	NR	>100	0	<1.0	NT
E 09/12/06	0	NR	36	>50	2.8	NT	0	NR	>100	0	<1.0	NT
E 10/10/06	0	NR	32	>50	3.1	NT	0	NR	>100	0	<1.0	NT
E 11/07/06	0	NR	>100	0	<1.0	NT	5	NR	>100	0	<1.0	NT
E 02/06/07	0	NR	71	>50	1.4	NT	0	NR	>100	0	<1.0	NT

[a] O = EPA test; E = entity test
[b] UP = upstream control water
[c] C = laboratory water control
[d] LC_{50} = Median Lethal Concentration
[e] EC_{50} = Median effects concentration
NT = not tested

[f] %A = Percent Adversely Affected in 100% effluent
[g] TUa = Acute Toxicity Units
[h] NF = Near Field Sample In the Mahoning River
[i] %M = Percent Mortality in 100% effluent
ND = not determined
I = invalid test due to control mortality

Table 7. Summary of CHRONIC toxicity test results on the Thomas Steel Strip effluent from outfall 3IC00056001.

Test Date (a)	*Ceriodaphnia dubia 7-Day*											*Fathead Minnows 7-Day*				
	UP[b]	C[c]	IC_{25}[d]	TU_c[e]	Survival			Reproduction			FF[i]	UP[b]	C[c]	IC_{25}[d]	TU_c[e]	FF[i]
					LOEC[f]	NOEC[g]	TU_c[h]	LOEC[f]	NOEC[g]	TU_c[h]						
E 05/18/04	NR	NR	NR	5.6	NR	NR	5.6	NR	NR	5.6	NT	NR	NR	>100	≤1.0	NT
E 08/10/04	NR	NR	NR	5.6	NR	NR	5.6	NR	NR	5.6	NT	NR	NR	>100	≤1.0	NT
E 11/09/04	NR	NR	NR	20.8	NR	NR	20.8	NR	NR	20.8	NT	NR	NR	>100	≤1.0	NT
E 03/13/05	NR	NR	NR	1.4	NR	NR	1.4	NR	NR	1.4	NT	NR	NR	>100	≤1.0	NT
E 05/17/05	NR	NR	NR	28.6	NR	NR	28.6	NR	NR	28.6	NT	NR	NR	>100	≤1.0	NT
E 08/09/05	0	NR	NR	2.8	NR	NR	2.8	NR	NR	2.8	NT	15	NR	>100	≤1.0	NT
E 11/29/05	0	NR	NR	1.5	NR	NR	1.5	NR	NR	1.5	NT	0	NR	>100	≤1.0	NT
E 02/23/06	80	NR	I	I	I	I	I	I	I	I	NT	10	NR	>100	1.4	NT
E 05/16/06	0	NR	NR	11.4	NR	NR	11.4	NR	NR	11.4	NT	10	NR	>100	≤1.0	NT
E 08/29/06	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	0	NR	>100	≤1.0	NT
E 09/12/06	0	NR	NR	11.4	NR	NR	11.4	NR	NR	11.4	NT	0	NR	>100	≤1.0	NT
E 10/10/06	0	NR	NR	50	NR	NR	50	NR	NR	50	NT	27	NR	>100	1.4	NT
E 11/07/06	0	NR	NR	11.4	NR	NR	11.4	NR	NR	11.4	NT	17	NR	>100	1.4	NT
E 02/06/07	0	NR	NR	11.4	NR	NR	11.4	NR	NR	11.4	NT	2	NR	>100	≤1.0	NT

[a]O = EPA test; E = entity test
[b]UP = upstream control water
[c]C = laboratory water control
[d]IC_{25} = inhibition concentration twenty-five
[e]TU_c = chronic toxicity units based on IC_{25}
[f]LOEC = lowest observed effects concentration
[g]NOEC = no observed effects concentration
[h]TU_c = chronic toxicity units
[i]FF = far-field effect
[j]STU_c = TUc for survival
[k]GTU_c = TUc for growth
NT = not tested
ND = not determined
I = invalid test due to excess adverse effects in control water

Table 8. Summary of the macroinvertebrate data collected from artificial substrates (quantitative evaluation) and natural substrates (qualitative evaluation) in the Mahoning River study area, July - September 2006 and 1994. Mixing zone samples are denoted in italics.

RIVER MILE (Year)		Density (3/ft2)	Quant. Taxa	Qual. Taxa	Qual. EPT[a]	Total Taxa	Sensitive Taxa (Qual.)	ICI	Narrative Evaluation
39.1	(2006)	527	33	44	11	61	14	30[ns]	Marginally Good
39.1	(1994)	560	30	35	7	51	7	34	Good
39.06	*(2006)*	*519*	*47*	*9*	*1*	*52*	*1*	*24*	*Fair*
39.06	*(1994)*	*378*	*24*	*5*	*0*	*28*	*0*	*16*	*Fair*
38.3	(2006)	476	37	48	14	63	16	30[ns]	Marginally Good
38.2	(1994)	300	34	31	6	51	6	26*	Fair

Ecoregion Biocriteria: Invertebrate Community Index (ICI)

Erie-Ontario Lake Plain (EOLP)		
WWH	EWH	MWH
34	46	22

Notes:

a EPT = total Ephemoptera (mayflies), Plecoptera (stoneflies) and Trichoptera (caddisflies) taxa richness.

ns Nonsignificant departure from ecoregional biocriteria (≤4 ICI units)

* Significant departure from ecoregion biocriteria (>4 ICI units)

Table 9. Effluent Data for Thomas Steel Strip

Parameter	Units	# of Samples	# > MDL	Average PEQ	Maximum PEQ
Self-Monitoring (SWIMS) Data					
Total Dissolved Solids	mg/l	231	231	1713.5	2145.9
Cyanide, free	µg/l	509	366	48.34	78.0
Iron	µg/l	4	4	2619.	3588.
Selenium	µg/l	262	112	5.769	8.581
Cadmium	µg/l	2	0	--	--
Nickel	µg/l	262	241	262.7	390.36
Zinc	µg/l	262	260	83.984	123.97
Aluminum	µg/l	231	222	95.291	128.68
Lead	µg/l	262	0	--	--
Chromium, total	µg/l	262	31	8.695	12.743
Copper	µg/l	262	261	148.44	221.07
$Chromium^{+6}$, dissolved	µg/l	262	0	--	--
Dibromochloromethane [C]	µg/l	21	0	--	--
Chloroform [C]	µg/l	64	26	229.73	232.92
Methyl Bromide	µg/l	21	0	--	--
Methyl Chloride	µg/l	21	0	--	--
Methylene Chloride [C]	µg/l	21	0	--	--
Chlorine, tot. res.	µg/l	66	19	9271.	12700.
Mercury	µg/l	19	19	0.061	0.106
Halomethanes	µg/l	9	6	59.13	81.0
Ohio EPA Data					
Chloride	mg/l	1	1	1665.6	2281.6
Potassium	mg/l	1	1	18.1	24.8
Strontium	µg/l	1	1	2217.7	3038.

[C] Carcinogen

Table 9. Effluent Data for Thomas Steel Strip - Continued.

Parameter	Units	# of Samples	# > MDL	Average PEQ	Maximum PEQ
Form 2.C. Application Data					
Sulfite	mg/l	1	1	2136.3	2926.4
Boron	µg/l	1	1	7830.	10726.
Molybdenum	µg/l	1	1	152.53	208.9
Ohio EPA Data and Form 2.C. Application Data Combined					
Ammonia	mg/l	2	2	103.	141.36
NO2+NO3	mg/l	2	2	6.075	8.32
Phosphorus	mg/l	2	2	1.01	1.39
Barium	µg/l	2	2	45.77	62.7
Magnesium	mg/l	2	2	48.55	66.5
Manganese	µg/l	2	2	88.77	121.6
Cyanide, total	mg/l	2	2	748.98	1026.
Bromodichloromethane [C]	µg/l	4	1	9.49	13.0
Naphthalene	µg/l	2	1	13.58	18.6
Butylbenzylphthalate	µg/l	2	1	16.294	22.32

[C] Carcinogen

Table 10. Water Quality Criteria Used in the CONSWLA

Parameter	Units	Outside Mixing Zone Criteria: Average: Human Health	Average: Agri-culture	Average: Aquatic Life	Inside Maximum Aquatic Life	Mixing Zone Maximum
Antimony	µg/L	14.[C]	–	190.	900.	1800.
Arsenic	µg/L	50.[C]	100.	150.	340.	680.
Bis(2-Ethylhexl)Phthalate	µg/L	1.8 [C]	–	8.4	1100.	2100.
Barium	µg/L	2400.[C]	–	220.	2000.	4000.
Boron	µg/L	3100.[C]	–	950.	8500.	17000.
Bromomethane	µg/L	4000.	–	16.	38.	75.
Bromodichloromethane	µg/L	460.	–	–	–	–
Butylbenzyl phthalate	µg/L	300.[C]	–	23.	130.	260.
Chlorine, tot. res.	µg/L	–	–	11.	19.	38.
Chloroform	µg/L	5.7 [C]	–	140.	1300.	2600.
Chromium $^{+6}$, diss.	µg/L	–	–	10.[C]	16.	31.
Cobalt	µg/L	–	–	24.	220.	440.
Cyanide, free	µg/L	700.[C]	–	5.2 [C]	22.[C]	92.
1,4-Dichlorobenzene	µg/L	2600.	–	9.4	57.	110.
Dichloromethane	µg/L	16000.	–	1900.	11000.	22000.
Di-n-butyl phthalate	µg/L	2700.[C]	–	21.[C]	110.[C]	–
Fluoride	µg/L	–	2000.	–	–	–
Iron	µg/L	–	5000.	–	–	–
Mercury [A]	µg/L	0.012	10.	0.91	1.7	3.4
Molybdenum	µg/L	–	–	20000.	190000.	370000.
Naphthalene	µg/L	–	–	21.	170.	340.
Nitrate+Nitrite	mg/L	–	100.	–	–	–
Phenol	µg/L	21000.[C]	–	400.	4700.	9400.
Selenium	µg/L	11000.	50.	5.0	–	–

[A] Bioaccumulative Chemical of Concern (BCC)
[C] Pennsylvania Water Quality Criteria.

Table 10. Water Quality Criteria Used in the CONSWLA - Continued.

		Outside Mixing Zone Criteria				
		Average			Inside Maximum	Mixing Zone
Parameter	Units	Human Health	Agri-culture	Aquatic Life	Aquatic Life	Maximum
Silver (Seg. 1)	µg/L	–	–	1.3	9.4[E]	51.[E,F]
Silver (Seg. 2)	µg/L	–	–	1.3	25 [E,F]	75.[E,F]
Silver (Seg. 3)	µg/L	–	–	1.3	23.[E,F]	110.[E,F]
Silver (Seg. 4)	µg/L	–	–	1.3	22.[E,F]	55.[E,F]
Silver (Seg. 6)	µg/L	–	–	1.3	22.[E,F]	37.[E,F]
Silver (Seg. 9)	µg/L	–	–	1.3	23.[E,F]	51.[E,F]
Strontium	µg/L	–	–	5300.	48000.	95000.
Thallium	µg/L	1.7 [C]	–	13.[C]	65.[C]	160.
Total Dissolved Solids	mg/L	–	–	1500.	–	–
Toluene	µg/L	6800.[C]	–	62.	560.	1100.

[C] Pennsylvania Water Quality Criteria.

[E] Local river hardness at critical low design flow was used to determine the water quality criteria. Segment 1 is at the Ohio Pennsylania state line (RM 11.43, hardness = 179 mg/L), Segment 2 is from the Orion Power Intake to the Ohio Pennsylania state line (RM 29.7 - RM11.43, hardness - 177 mg/L), Segment 3 is the WCI Intake to the Orion Power Intake (RM 36.5 to Rm 29.7, hardness = 168 mg/L), Segment 4 is from Leavittsburg to the WCI Intake (RM 45.5 to RM 36.5, hardness = 165 mg/L), Segment 6 is an unnamed tributary to the Mahoning that Mittal discharges to (hardness = 165 mg/L), and Segment 9 is Little Squaw Creek (hardness = 171 mg/L).

[F] Effective Criteria Based on Application of Dissolved Metal Translator.

Table 11. Instream Conditions and Discharger Flow for CONSWLA Model

Parameter	Units/Outfall		Value	Basis
Mahoning River Upstream				
7Q10	cfs	annual	135	USGS gage #03094000, 1969-06 data
1Q10	cfs	annual	127	USGS gage #03094000, 1969-06 data
30Q10	cfs	summer	178	USGS gage #03094000, 1969-06 data
	cfs	winter	191	USGS gage #03094000, 1969-06 data
HMQ	cfs	annual	379	USGS gage #03094000, 1969-06 data
Meander Creek at mouth				
7Q10	cfs	annual	6.19	USGS gage #03097500, 1929-51 data
1Q10	cfs	annual	6.19	USGS gage #03097500, 1929-51 data
30Q10	cfs	summer	6.19	USGS gage #03097500, 1929-51 data
	cfs	winter	6.19	USGS gage #03097500, 1929-51 data
HMQ	cfs	annual	6.19	USGS gage #03097500, 1929-51 data
Mosquito Creek at mouth				
7Q10	cfs	annual	10.6	USGS gage #03095500, 1954-91 data
1Q10	cfs	annual	9.47	USGS gage #03095500, 1954-91 data
30Q10	cfs	summer	14.0	USGS gage #03095500, 1954-91 data
	cfs	winter	12.6	USGS gage #03095500, 1954-91 data
HMQ	cfs	annual	28.0	USGS gage #03095500, 1954-91 data
Mill Creek at mouth				
7Q10	cfs	annual	9.99	USGS gage #03098500, 1952-71 data
1Q10	cfs	annual	9.87	USGS gage #03098500, 1952-71 data
30Q10	cfs	summer	10.7	USGS gage #03098500, 1952-71 data
	cfs	winter	15.7	USGS gage #03098500, 1952-71 data
HMQ	cfs	annual	14.3	USGS gage #03098500, 1952-71 data
Discharger Flow	cfs			
CSC Industries	005		2.17	NEDO
Thomas Steel Strip	001		2.79	NEDO
Warren Consolidated	007		3.84	NEDO
Industries	008		9.78	NEDO
	010		0.71	NEDO
	011		0.99	NEDO
	012		0.248	NEDO
	013		53.38	NEDO
	015		1.72	NEDO
	016		1.81	NEDO
ISG (Mittal) Steel	014		7.27	NEDO
Warren WWTP	001		24.8	NEDO
Reactive Metals, Inc.	001		0.696	NEDO
Niles WWTP	001		9.59	NEDO
McDonald Steel	001		1.45	NEDO

Table 11. Instream Conditions and Discharger Flow for CONSWLA Model - Continued.

Parameter	Units/Outfall		Value	Basis
Discharger Flow	cfs			
Mosquito Creek WWTP	001		6.5	NEDO
Meander Creek WWTP	001		6.19	NEDO
Boardman WWTP	001		7.74	NEDO
Orion Power	001		298.6	NEDO
	002		6.19	NEDO
	008		0.002	NEDO
Girard WWTP	001		7.74	NEDO
Youngstown WWTP	001		54.2	NEDO
Campbell WWTP	001		2.94	NEDO
Struthers WWTP	001		9.28	NEDO
Lowellville WWTP	001		0.792	NEDO
Mixing Assumption	%	average	100	Stream-to-discharge ratio
	%	maximum	100	Stream-to-discharge ratio
Instream Temperature	ºC	summer	22	STORET [C]; 38 values, 0<MDL, 1990-98
		winter	4.1	STORET [C]; 27 values, 0<MDL, 1990-98
Instream pH	S.U.	summer	7.8	STORET [C]; 38 values, 0<MDL, 1990-98
		winter	7.9	STORET [C]; 27 values, 0<MDL, 1990-98
Background Water Quality				
Ammonia	mg/L	summer	0.09	STORET; 42 values, 8<MDL, 1999-2005
		winter	0.13	STORET; 16 values, 0 <MDL, 1999-2005
Arsenic	µg/L	annual	2.0	STORET; 124 values, 54<MDL, 1999-2005
Antimony	µg/L	annual	0.0	No representative data available
Barium	µg/L	annual	36.	STORET; 124 values, 0<MDL, 1999-2005
Boron	µg/L	annual	0.	No representative data available
Bis(2E)Phthalate	µg/L	annual	0.	No representative data available
Butylbenzl phthalate	µg/L	annual	0.	No representative data available
Cadmium	µg/L	annual	0.	STORET [C]; 82 values, 82<MDL, 1999-2006
Chlorine, total res	µg/L	annual	0.	No representative data available
Chromium, tot.	µg/L	annual	0.	STORET [C]; 82 values, 81<MDL, 1999-2006
Chromium^{+6}, diss	µg/L	annual	0.	No representative data available
Chloroform	µg/L	annual	0.	No representative data available
Copper	µg/L	annual	0.	STORET [C]; 82 values, 81<MDL, 1999-2006
Cyanide free	µg/L	annual	0.	No representative data available
Fluoride	µg/L	annual	0.	No representative data available
Iron	µg/L	annual	747.	STORET; 124 values, 0<MDL, 1999-2005
Lead	µg/L	annual	1.24	STORET [C]; 82 values, 70<MDL, 1999-2006
Mercury	µg/L	annual	0.	No representative data available
Molybdenum	µg/L	annual	0.	No representative data available

Table 11. Instream Conditions and Discharger Flow for CONSWLA Model - Continued

Parameter	Units		Value	Basis
Background Water Quality (Cont.)				
Naphthalene	µg/l	annual	0.	No representative data available
Nickel	µg/l	annual	0.	STORET; 82 values, 82<MDL, 1999-2006
Phenol	µg/l	annual	0.	No representative data available
Selenium	µg/l	annual	0.	STORET; 15 values, 15<MDL,
Silver	µg/l	annual	0.	No representative data available
Strontium	µg/l	annual	151.	STORET; 124 values, 0<MDL, 1999-2005
Thallium	µg/l	annual	0.	No representative data available
Toluene	µg/l	annual	0.	No representative data available
TDS	mg/l	annual	307.	STORET; 109 values, 0<MDL, 1999-2005
Zinc	µg/l	annual	8.97	STORET; 82 values, 55<MDL, 1999-2006

[C] STORET station # 602280 Mahoning River @ Leavittsburg - Leavitt Rd. RM 45.51

Table 12. Summary of Effluent Limits to Maintain Applicable Water Quality Criteria

Parameter	Units	Average Human Health	Average Agri Supply	Average Aquatic Life	Maximum Aquatic Life	Inside Mixing Zone Maximum
Ammonia - S	mg/l	--	--	--	21.	--
Boron	µg/l	81940.[A E]	--	11820.	100800.[A]	17000
Butylbenzylphthalate	µg/l	223500.[E]	--	1154.[A]	6149.[A]	260.
Cadmium [B]	µg/l	--	--	1.7[E]	14.[A]	14.
Chlorine, total res summer	µg/l	--	--	21.	35.	38.
Chloroform	µg/l	422.[E]	--	7023.[A]	61490.[A]	2600.
Chromium, tot. [B]	µg/l	--	--	553.	4900.[A]	4900.
Copper	µg/l	--	--	44.[D]	55.[D]	57.
Cyanide, free	µg/l	700.[E]	--	39.	144.[A]	92.
Iron	µg/l	--	27010.	--	--	--
Lead [B]	µg/l	--	--	14.[D,E]	257.[D]	400.
Mercury [C]	µg/l	0.057	48.[A]	2.2	4.0 [A]	3.4
Naphthalene	µg/l	--	--	553.[A]	4438.[A]	340.
Nickel	µg/l	--	--	330.	1300.[A]	1300.
Selenium	µg/l	142000.	646.	40.	--	--
Silver [B]	µg/l	–	–	9.0	167.[A D]	35.[D]
Strontium	µg/l	--	--	258600.[A]	2263000.[A]	95000.
Total Dissolved Solids	mg/l	--	--	33970.	--	--
Zinc	µg/l	--	--	330.	278.	330.

[A] Allocation must not exceed the Inside Mixing Zone Maximum.
[B] Parameter would not require a WLA based on reasonable potential procedures, but allocation requested for use in pretreatment program.
[C] Bioaccumulative Chemical of Concern (BCC); no mixing zone allowed after 11/15/2010, WQS must be met at end-of-pipe - unless the requirements for an exception are met as listed in 3745-2-08.
[D] WLA based on applicable dissolved metal translator.
[E] Pennsylvania water quality criteria was applied

Table 13. Parameter Assessment for Outfall 001

Group 1: Due to a lack of criteria, the following parameters could not be evaluated at this time.

Aluminum	Chloride	Cyanide, tot.
Halomethanes	Magnesium	Manganese
Methyl Chloride	Phosphorus	Potassium
Sulfate		

Group 2: PEQ < 25% of WQS or all data below minimum detection limit; WLA not required. No limit recommended, monitoring optional.

Barium	Bromodichloromethane	Cadmium
Chromium, tot.	$Chromium^{+6}$, diss.	Dibromochloromethane
Lead	Methyl Bromide	Methylene Chloride
Molybdenum	Nitrate+Nitrite	Silver

Group 3: PEQ_{max} < 50% of maximum PEL and PEQ_{avg} < 50% of average PEL. No limit recommended, monitoring optional.

Butylbenzylphthalate	Iron	Naphthalene
NH_3-N avg. (S&W)	Selenium	Strontium
TDS	Zinc	

Group 4: $PEQ_{max} \geq$ 50% but <100% of the maximum PEL or $PEQ_{avg} \geq$ 50% but < 100% of the average PEL. Monitoring is appropriate.

Boron	Chloroform

Group 5: Maximum PEQ $\geq$ 100% of the maximum PEL or average PEQ $\geq$ 100% of the average PEL, or either the average or maximum PEQ is between 75 and 100% of the PEL and certain conditions that increase the risk to the environment are present. Limit recommended.

Limits to Protect Numeric Water Quality Criteria

Parameter	Units	Applicable Period	Recommended Effluent Limits Average	Maximum
Chlorine, tot. res.	µg/l	annual	21.	35.
Copper	µg/l	annual	44.	55.
Cyanide, free	µg/l	annual	39.	92.
Mercury (<11/15/2010)	µg/l	annual	0.057	4.0
Mercury (>11/15/2010)	µg/l	annual	0.012	1.7
Nickel	µg/l	annual	330.	1300.

Table 14. Final effluent limits and monitoring requirements for Thomas Steel Strip outfall 3IC00056001 and the basis for their recommendation.

		Effluent Limits				
		Concentration		Loading (kg/day)[a]		
Parameter	Units	30 Day Average	Daily Maximum	30 Day Average	Daily Maximum	Basis[b]
Flow	MGD	- - - - - - - - - - - - Monitor - - - - - - - - - - - - - - -				M[c]
Dissolved Solids	mg/l	- - - - - - - - - - - - Monitor - - - - - - - - - - - - - - -				M[c]
Suspended Solids	mg/l					
Summer		30	45	192	288	ABS/EP
Winter		30	45	233	350	ABS/EP
Ammonia-N	mg/l					
Summer		--	13.6	--	92.7	WLA/IMZM
Winter		--	12.4	--	84.5	WLA/IMZM
Oil and Grease	mg/l					
Summer		10	20	64	128	ABS/EP
Winter		10	20	78	156	ABS/EP
pH	S.U.	- - - - - - - - - - - - - 6.5 to 9.5 - - - - - - - - - - - -				ABS/EP
Chlorine Residual	mg/l	0.021	0.035	0.14	0.24	WLA
Cyanide, Free	mg/l	0.039	0.092	0.27	0.63	WLA
Boron, T. R.	µg/l	- - - - - - - - - - - - Monitor - - - - - - - - - - - - - - -				M/RP[c]
Cadmium, T. R.	µg/l	- - - - - - - - - - - - Monitor - - - - - - - - - - - - - - -				M[c]
Chromium, T. R.	µg/l	- - - - - - - - - - - - Monitor - - - - - - - - - - - - - - -				M[c]
Hex. Chromium (Dissolved)	µg/l	- - - - - - - - - - - - Monitor - - - - - - - - - - - - - - -				M[c]
Copper, T. R.	µg/l	--	130	--	0.74	WLA
Copper, Dissolved	µg/l	--	57	--	--	WLA/IMZM
Lead, T. R.	µg/l	- - - - - - - - - - - - Monitor - - - - - - - - - - - - - - -				M[c]
Mercury, T.	ng/l	25	1700	0.00017	0.012	Variance;WQS
Nickel, T. R.	µg/l	330	1300	1.87	7.38	WLA
Zinc, T. R.	µg/l	- - - - - - - - - - - - Monitor - - - - - - - - - - - - - - -				M[c]
Chloroform	µg/l	- - - - - - - - - - - - Monitor - - - - - - - - - - - - - - -				M/RP[c]
Whole Effluent Toxicity						
Acute	TUa	--	1.5	--	--	WET
Chronic	TUc	- - - - - - - - Monitor (w/o trigger) - - - - - - - - -				WET

Table 14. Con't.

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[a] Effluent loadings based on discharge flows of:
1.69 MGD summer TSS and oil&grease limits;
2.05 MGD winter TSS and oil&grease limits;
1.80 MGD ammonia, chlorine, cyanide and mercury limits;
1.5 MGD copper and nickel limits.

[b] Definitions: ABS = Antibacksliding Rule (OAC 3745-33-05(E) and 40 CFR Part 122.44(l)); BPJ = Best Professional Judgment; EP = Existing Permit; M = Monitoring; RP = Reasonable Potential for requiring water quality-based effluent limits and monitoring requirements in NPDES permits (3745-33-07(A)); Variance = mercury variance granted under OAC Rule 3745-33-07(D)(10); WET = Whole Effluent Toxicity (OAC 3745-33-07(B)) ; WLA = Wasteload Allocation procedures (OAC 3745-2); WLA/IMZM = Wasteload Allocation limited by Inside Mixing Zone Maximum; WQS = Ohio Water Quality Standards (OAC 3745-1).

[c] Monitoring of flow and other indicator parameters is specified to assist in the evaluation of effluent quality and treatment plant performance.

Table 15. Final effluent limits and monitoring requirements for Thomas Steel Strip outfalls 3IC00056601 and 3IC00056603 and the basis for their recommendation.

		Effluent Limits				
		Concentration		Loading (kg/day)[a]		
Parameter	Units	30 Day Average	Daily Maximum	30 Day Average	Daily Maximum	Basis[b]
Outfall 601						
Flow	MGD	- - - - - - - - - - - - Monitor - - - - - - - - - - - - - - -				M[c]
Suspended Solids	mg/l	30.8	59.6	37.9	73.5	BCT
Oil and Grease	mg/l					
pH	S.U.	- - - - - - - - - - - - Monitor - - - - - - - - - - - - - - -				M[c]
Cadmium, T. R.	µg/l	252	670	0.310	0.824	BAT
Chromium, T. R.	µg/l	1660	2700	2.046	3.31	BAT
Hex. Chromium (Dissolved)	µg/l	--	--	0.57	0.92	ABS/EP
Copper, T. R.	µg/l	845	1386	1.03	1.69	ABS/EP
Lead, T. R.	µg/l	420	680	0.519	0.838	BAT
Mercury, T.	µg/l	- - - - - - - - - - - - Monitor - - - - - - - - - - - - - - -				M[c]
Nickel, T. R.	µg/l	2320	3880	2.85	4.76	BAT
Silver, T. R	µg/l					
Zinc, T. R.	µg/l	1440	2550	1.77	3.13	BAT
Naphthalene	µg/l	--	--	--	0.0042	BAT
Tetrachloroethylene	µg/l	--	--	--	0.0028	BAT
Total Toxic Organics	µg/l	--	2070	--	2.55	BAT
Outfall 603						
Flow	MGD	- - - - - - - - - - - - Monitor - - - - - - - - - - - - - - -				M[c]
Cyanide, amenable to chlorination	µg/l	320	860	--	--	BAT/EP

[a] Effluent concentrations based on average discharge flow of 0.325 MGD.

[b] Definitions: ABS = Antibacksliding Rule (OAC 3745-33-05(E) and 40 CFR Part 122.44(l)); BAT = Best Available Control Technology Currently Available, 40 CFR Parts 420, Iron and Steel Manufacturing and 433, Metal Finishing; BCT = Best Conventional Pollutant Control Technology, 40 CFR Parts 420, Iron and Steel Manufacturing, and 433, Metal Finishing; EP = Existing Permit; M = Monitoring.

[c] Monitoring of flow and other indicator parameters is specified to assist in the evaluation of effluent quality and treatment plant performance.

Attachment A - Effluent Guideline Calculations for Thomas Steel Strip

Attachment B - Biological Survey Results for 2006